UNITED STATES COAST AND GEODETIC SURVEY.
F. M. THORN, Superintendent.

PACIFIC COAST.

COAST PILOT

OF

CALIFORNIA, OREGON, AND WASHINGTON.

BY

GEORGE DAVIDSON,
ASSISTANT U. S. COAST AND GEODETIC SURVEY.

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AGENCIES ON THE PACIFIC COAST FOR THE SALE OF THE CHARTS, TIDE-TABLES, AND COAST PILOTS OF THE UNITED STATES COAST AND GEODETIC SURVEY.

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CHARTS.

As will be seen by a reference to the Catalogue, these are embraced in four classes:

1. Sailing Charts, on a scale of $\frac{1}{1,200,000}$, which exhibit the approaches to a large extent of coast, give the off-shore soundings, and enable the navigator to identify his position as he approaches from the open sea.

2. General Charts of the Coast, on scales of $\frac{1}{600,000}$ and $\frac{1}{200,000}$, which show the configuration of the shore, the positions of islands, rocks, and shoals, the light-houses, life-saving stations, and other natural and artificial landmarks, and are intended especially for coastwise navigation.

3. Coast Charts, on a scale of $\frac{1}{80,000}$, by means of which the navigator is enabled to avail himself of the channels for entering the larger bays and harbors, and to recognize the beacons, buoys, and light-houses by their distinctive features and positions.

4. Charts of harbors, bays, and rivers, on large scales, intended to meet the needs of local navigation.

As required by law, the Charts are sold, as nearly as practicable, at the cost of the paper and printing. They are based upon accurate trigonometrical surveys, and every effort is made to keep them corrected so as to include all information received up to the time they are issued from this office. Persons using the Charts can always obtain the information required for making subsequent additional corrections from the Coast and Geodetic Survey Notices to Mariners.

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The predicted times and heights of the tide at the chief ports of the United States are given in these Tables for every day of the year, with a Table of Constants, by means of which the times and heights at intermediate ports may be ascertained. One set of Tables for the ports of the Atlantic and Gulf Coasts, and one set for those of the Pacific Coast, are published annually. Price of each set, 25 cents.

NOTICES TO MARINERS.

Notices to Mariners, showing changes in lights and buoys, discoveries of rocks, shoals, and other dangers to navigation, charts condemned, new charts, and other publications issued, are issued monthly, and can be found at the Sale Agencies of the Survey at all principal Ports, at the Custom-Houses, the Branch Hydrographic Offices of the Navy Department, and at other usual resorts of mariners. These "Notices" will be regularly forwarded, *free of charge*, to all persons who furnish their names and post-office addresses to the

"Assistant in charge of Office,
"U. S. Coast and Geodetic Survey,
"Washington, D. C."

"Notices" will not be sent to any address for a longer period than one year, unless the application for same is renewed. Prompt notice of changes of addresses should be given.

CATALOGUES.

Copies of the Coast and Geodetic Survey "Catalogue of Charts and other Publications" can also be obtained, *free of charge*, on application at the Sale Agencies or by addressing the "Assistant in charge of Office."

U. S. COAST AND GEODETIC SURVEY OFFICE,
Washington, D. C., 1889.

INTRODUCTION.

The first edition of the Directory of the Pacific Coast of the United States was undertaken while I had command of the United States Coast Survey brig *R. H. Fauntleroy* during the years 1854–'58. It was written wholly outside of official hours and official duties, and part of it was first published in one of the daily journals of San Francisco.

My earlier duties on this coast in the determination of geographical positions at primary standard stations, in the secondary stations of the Geographical Reconnaissance of the Coast from Mexico to British Columbia, 1850–'54, and in examining sites for light-houses, had somewhat familiarized me with the general features of nearly every mile of the sea-board. The accumulation of observations on the currents, winds, fogs, dangers, landmarks, etc., warned me that I could not trust them to memory or to desultory notes. Therefore I felt it a duty that this knowledge should be put in proper shape and collated with the information and experience of others, for the benefit of the rapidly growing commerce of the Pacific coast.

When I had written the matter of the first edition of the Directory, or Coast Pilot, and offered it to Superintendent Bache, he at first hesitated about receiving it because he had known nothing of it officially, but finally accepted it upon my assuming the responsibility of the accuracy of the work.

It received such practical indorsement from the navigators of the Pacific Coast that a second edition was called for in 1862* by Superintendent Bache, and a third edition in 1869 by Superintendent Peirce.

In these editions, such details and new material as had been gathered, and such experience as I had acquired, were added to the previous edition with as little change by rewriting as practicable.

In 1880, Superintendent Patterson asked me for a fourth edition, and I undertook the work in addition to my regular duties. However, I soon found that the results of the systematic and extended surveys of my fellow-workers on land and at sea, the accumulation of a multitude of details where only general characteristics had before been available, the greatly increased number of the aids to navigation, the development of the data for predicting the tides in every bay and harbor, the many valuable facts from the daily life of the thorough and practical navigators on our coast, the numerous views of headlands, points, islands, rocks, and landfalls, the special examinations of important dangers and dangerous localities, and my further observations, experience, and study through the intervening years, could not be simply interpolated in the last edition.

I had an unexpected task before me; nevertheless, I have entirely rewritten this fourth edition, which has grown to three or four times the size of the third.

I have endeavored to give some information about the seasons, fogs, winds, and currents of the coast through the body of the work, but more particularly for the vicinity of the Gulf of the Farallones. Very much remains to be done in this matter.

When the vast labyrinth of the interior waters of Washington is alive with traffic, much fuller descriptions will be needed for that region.

The views which have been introduced into this edition have been drawn from original sketches. About a dozen are from originals made in 1851–'53. In 1867, I began making views

* This edition was reprinted bodily, without proper credit, in the "Sailing Directions for the West Coast of North America, between Panama and Queen Charlotte Islands, by James F. Imray, F. R. G. S., second edition. London: James Imray & Son, Minories and Tower Hill. 1868."

of the headlands and landfalls when traveling along this coast and that of Alaska in government and passenger vessels, and have continued the practice to date, making a few special trips upon which photographs were also taken. In the last four or five years I have been assisted by Mr. Ferdinand Westdahl, who has made other views when traveling and when on special duty on light-house steamers. Mr. Westdahl and I entered upon the reduction of these sketches, but under the pressure of the preparation of the Coast Pilot and of current duties the work progressed too slowly, and the reduction was finally assigned to Assistant Rockwell, who has made nearly all the drawings under my supervision. Mr. Westdahl has made some of the later ones. About one hundred of the original views have not been used. After this work was done, Assistant Gilbert made about forty views of the approaches of the Canal de Haro and Rosario Strait from the Gulf of Georgia and of the eastern shore to the forty-ninth parallel. Thirty of these have been drawn by Assistant Rockwell. No party has yet been especially assigned for the duty of taking views of the capes, islands, and landfalls on this coast, but I have inaugurated a scheme for photographing the whole sea board, both for landfall and for special objects, so as to obtain a continuous series of views for the mariner.

The work which I here present has been done under the heavy pressure of daily official routine and absorbing duties, and therefore it has been a long time in hand. I have striven to incorporate all important matter known to me at date, and I earnestly trust that the navigator will find no essential error in the very large number of descriptions and statements.

GEORGE DAVIDSON,
Assistant U. S. Coast and Geodetic Survey.

PREFACE.

Before the acquisition of California by the United States, comparatively little was known of the hydrography and geography of its coast, except by the few navigators trading along its seaboard, or the daring otter-hunter, familiar with every cove, rock, and headland.

In the following pages it is proposed to state what is known at the present time of the Pacific coast of the United States, from the southern boundary of California, in latitude 32° 32′, to the northern boundary of Washington Territory, in latitude 49°, embracing an ocean shore-line of over three thousand one hundred and twenty miles, divided as follows: California, including the islands of Santa Barbara Channel, one thousand and ninety-seven miles; Oregon two hundred and eighty five miles; Washington Territory, including islands in Washington Sound and shores of Puget Sound, one thousand seven hundred and thirty-eight miles.

Whatever has not come under our own criticism will be taken from the published reports and maps of the U. S. Coast and Geodetic Survey.

The names adopted will be those most reliable, or in use at the present time.

Where any known changes have taken place they will be stated.

The longitude is reckoned west from Greenwich, and is based upon astronomical observations and telegraphic determinations. The U. S Coast and Geodetic Survey astronomical station at Lafayette Park, San Francisco, is $8^h\ 09^m\ 42.5^s$ west from Greenwich.

Where any geographical position is given to the nearest minute only, it has been taken from the latest chart of the Coast and Geodetic Survey.

Tides.—Each year the Survey publishes a small pamphlet which gives the times and heights of every high and low water for the principal ports on the Pacific coast, with constants for determining similar quantities for intermediate ports. But in the absence of this publication, tables and examples are introduced to show the manner of predicting the times and heights of high and low waters at San Francisco and other harbors.

Soundings are given for the mean of the lower low waters. The lowest tides may fall one and a quarter feet below this plane.

Distances are expressed in geographical (nautical) miles.

Bearings are magnetic. The easterly variation of the compass has nearly reached the maximum throughout the Pacific coast. This maximum will probably be reached in 1895.

Descriptions of light-houses, fog signals, buoys, and other aids to navigation are taken from the published notices of the Light-House Board, and from personal examination.

In conformity with section 4678 of the Revised Statutes of the United States, the following order is observed in coloring and numbering the buoys along the coast, or in bays, harbors, sounds, or channels, viz:

1. In approaching the channel, etc., from seaward, RED BUOYS, with EVEN NUMBERS, will be found on the STARBOARD side of the channel, and must be left on the STARBOARD hand in passing in.

2. In approaching the channel, etc., from seaward, BLACK BUOYS, with ODD NUMBERS, will be found on the PORT side of the channel, and must be left on the PORT hand in passing in.

3. BUOYS painted with RED and BLACK HORIZONTAL STRIPES will be found on OBSTRUCTIONS, with channel-ways on either side of them, and may be left on either hand in passing in.

4. BUOYS painted with WHITE and BLACK PERPENDICULAR STRIPES will be found in MID-CHANNEL, and must be passed close to to avoid danger.

All other distinguishing marks to buoys will be in addition to the foregoing, and may be employed to mark particular spots, *a description of which will be given in the printed list of buoys.*

Perches, with balls, cages, etc., will, when placed on buoys, be at turning-points, the color and number indicating on what side they shall be passed.

Different channels in the same bay, sound, river, or harbor, will be marked, as far as practicable, by different descriptions of buoys. Principal channels will be marked by nun-buoys; secondary channels, by can-buoys; and minor channels, by spar-buoys. When there is but one channel, nun-buoys, properly colored and numbered, are usually placed on the starboard side, and can-buoys on the port side of it.

Day-beacons, stakes, and spindles (except such as are on the sides of channels, which will be colored like buoys) are constructed and distinguished with special reference to each locality, and particularly in regard to the background upon which they are projected.

Wherever practicable, the towers, beacons, buoys, spindles, and all other aids to navigation are arranged in the list in regular order *as they are passed by vessels entering from sea.*

By the laws of California, Oregon, and Washington, it is made a misdemeanor, punishable by fine or imprisonment, to moor a vessel, boat, or raft to any buoy, beacon, etc., or to damage, remove, or destroy any aid to navigation.

GEORGE DAVIDSON,
U. S. Coast and Geodetic Survey.

SAN FRANCISCO, CAL., 1889.

ERRATA.

Substitute on page 37 the following, derived from the latest data available:

Tides, Anaheim Landing.—The times and heights of the tides for San Diego, taken from the Tide Tables for the Pacific Coast, published each year by the Coast and Geodetic Survey, answer exactly for Anaheim Landing if the San Diego heights of high and low water be all diminished by three-tenths of a foot.

Substitute on page 48 the following, derived from the latest data available:

Tides at Santa Monica.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is $1^h\ 37^m$. The mean rise and fall of the tides is four and three-tenths feet; of spring tides five and seven tenths feet; and of neap-tides two and nine-tenths feet. The mean duration of the flood is $6^h\ 20^m$, and of the ebb $6^h\ 05^m$, and of the stand $0^h\ 39^m$. The average difference of the higher high and lower low waters of the same day was six and four-tenths feet, and the greatest nine feet.

To find the times and heights of high and low waters, apply the following corrections to the times and heights for San Diego published each year by the Coast and Geodetic Survey. For times of high water, subtract seven minutes; for low water, subtract two minutes. For height of high water, add four-tenths of a foot; for height of low water, take the San Diego height unchanged.

Substitute on page 52 the following, derived from the latest data available:

Tides.—At Point Hueneme the average time of high water after the moon's meridian passage is $9^h\ 32^m$; the average rise of the tides above the mean of the lower low waters of each day is three and seven-tenths feet; the greatest range observed in one day, from June to December, was eight and one half feet.

Substitute on page 61 the following, derived from the latest data available:

Tides at Santa Barbara.—The average time of high water after the moon's meridian passage is $1^h\ 37^m$, and the rise of tides above the average lower low water of each day is three and six tenths feet. To find the times and heights of the high and low waters of each day, first obtain from the tables of prediction the times and heights for San Diego, and then subtract seven minutes for the time of high water and four tenths of a foot for its height; for low water, subtract four minutes and one tenth of a foot.

Substitute on page 64 the following, derived from the latest data available:

Tides at Gaviota Landing.—The Corrected Establishment, or average time of high water after the moon's meridian passage, is $1^h\ 34^m$, and the average rise of the tide above the mean lower low waters of each day is three and six-tenths feet.

To find the times and heights of each high and low water throughout the year, take the times and heights for the given tides for San Diego from the annual tide-tables of the Coast Survey, and for the time of high water subtract ten minutes, and for the height subtract three-tenths of a foot; for low water subtract three minutes, but take the San Diego height unchanged.

Substitute on page 76 the following, derived from the latest data available:

Tides.—Corral Harbor: The average time of high water after the moon's meridian passage is $1^h\ 20^m$, and the average rise of the tide above the mean of the lower low waters of each day is three and seven tenths feet. To obtain the times and heights of the high and low waters, first take from the Tide Tables for the Pacific Coast the times and heights for San Diego; and then to get the time of high water here, subtract twenty-four minutes, and to get the time of low water subtract fifteen minutes. To find the height of high water subtract six-tenths of a foot, and for low water subtract four tenths of a foot.

Substitute on page 88 the following, derived from the latest data available:

Tides at Prisoner's Harbor.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is 1X^h 29^m; the mean rise and fall of the tides is three and seven-tenths feet, of spring tides four and nine tenths feet, and of neap-tides two and five-tenths feet; the average duration of the rise is 6^h 23^m, of the fall 6^h 02^m; the stand is about 40^m; the average difference in the heights of the morning and afternoon tides of the same day is one and two-tenths feet for the high waters, and one and eight-tenths feet for the low waters; the average difference of the highest high and lowest low waters of the same day is five and two tenths feet, and the greatest difference is seven feet.

To obtain the times and heights of each high and low water, first take from the Tide Tables for the Pacific Coast the times and heights for San Diego, and then to obtain the time of high water subtract fifteen minutes, and to obtain the time of low water subtract thirteen minutes; to obtain the height of high water subtract four tenths of a foot, and to obtain the height of low water subtract two tenths

Substitute on page 92 the following, derived from the latest data available:

The Tides at Becher Bay.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is 1X^h 26^m. The mean rise and fall of the tides is three and seven-tenths feet; of the spring tides, four and eight tenths feet; of the neap tides, two and six-tenths. The average duration of the rise is 6^h 22^m; of the fall, 6^h 03^m, and of the stand about 30^m. The average difference of the highest high and lowest low waters of the same day is five and three-tenths feet, and the greatest difference seven and a half feet.

The times of high and low waters are ten minutes earlier than the tables given for San Diego and the heights nearly the same.

Substitute on page 123 the following, derived from the latest data available:

Tides.—San Simeon Bay: The Corrected Establishment, or mean interval between the time of the moon's transit and time of high water, is X^h 38^m. The mean rise and fall of the tides is four feet; of spring tides five and one tenth feet; and of neap tides two and nine tenths. The mean duration of the flood is 6^h 04^m; of the ebb, 6^h 21^m. The rise of the highest tide observed (in June and July, 1884) was seven feet above the plane of reference, and the lowest was two and two-tenths below, thus giving an extreme range of nine and two tenths feet. The Tide Tables for the Pacific Coast, published for the Coast and Geodetic Survey, give the tides for San Simeon for every day in the year.

Page 143, lines 6 to 9 from bottom, tides in the harbor of Monterey, substitute the following, derived from the latest data available

Tides.—The Corrected Establishment, or mean interval between the time of high water, is X^h 43^m. The mean rise and fall of tides is four feet; of spring tides, five and one-tenth feet; and of neap-tides, two and nine-tenths feet. The mean duration of flood is 6^h 19^m; of the ebb, 6^h 06^m; and of the stand, 0^h 35^m.

Page 144, lines 9 to 11, tides in the harbor of Monterey, substitute the following.

The times and heights of high and low water at Monterey for every day in the year may be obtained from the Coast and Geodetic Survey Tide Tables for the Pacific Coast.

Substitute on page 148, lines 19 to 22, tides in Santa Cruz Harbor, the following, from the latest data available:

Tides.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is X^h 54^m. The mean rise and fall of the tides is four and three tenths feet; of spring-tides, five and four tenths; and of neap tides, three and two-tenths. The mean duration of the flood is 6^h 27^m, of the ebb, 5^h 58^m; and of the stand, 0^h 30^m.

Page 148, line 31, 1^h 38^m should read 1^h 13^m.

Page 148, line 35, 2^h 05^m should read 1^h 40^m.

Page 227, line 1, tides at Sausalito, substitute the following, derived from the latest data: Twenty two minutes earlier, should read six minutes later.

MEXICO.

COAST OF LOWER CALIFORNIA.

CORTES SHOAL.

Off the western coast of Lower California, and somewhat parallel therewith, there appears to be a range of submarine mountains whose summits, rising at irregular intervals above the water, form islands, and, nearing the surface at other points, form dangerous and extensive banks.

One of these reported dangers is a bank laid down with great similarity to the Cortes Bank,* and even designated the "Banco Cortes" on the French chart No. 1997. The shoalest part of this reported bank has ten fathoms upon it in three spots, situated between the latitudes 31° 33′ and 31° 43′, and longitudes 118° 44′ and 118° 52′, being nearly southeast by south a quarter south (SE. by S. ¼ S.), fifty miles from the Bishop Rock on Cortes Bank. It is laid down on the Spanish chart of 1863.

The chart of the California Coast, published in 1790 by Dalrymple, has a sign to indicate the Cortes Shoal reasonably close to its proper position.

The position assigned to this shoal is in the direct route of the steam-ships running between San Francisco and Mexican ports and Panama. Moreover, the area is very extensive, being three thousand square miles within the twenty-fathom curve and about one thousand five hundred square miles within the fifteen-fathom curve. The thirty-fathom line extends nearly ten miles outside the twenty-fathom line. The deepest soundings between the bank and the Bay of Todos Santos are only forty fathoms.

It was not found on any Admiralty chart, and in the 1867 edition of the French chart it is not shown. In 1867, through the good offices of the Pacific Mail Steam-ship Company, we were enabled to run a line of soundings thirty miles in length across the given locality; no bottom was found with two hundred fathoms of line. Unfortunately the weather was cloudy and no observations could be obtained after leaving San Francisco, but the departure of the vessel was approximately taken from the western point of the island of San Miguel, and a course laid across the assigned position of the ten-fathom soundings. The sea was so smooth that we readily detected the ground-swell on the edge of the Cortes Bank, and when abreast of the "Banco Cortes" a ground-swell was also felt for a short time, but we found no bottom, as stated. Subsequently we had no observations for position for several days, and therefore we may not have crossed the exact locality.

Although the existence of this shoal may be considered doubtful from available facts, yet the deep-sea soundings of the U. S. ship *Tuscarora* in 1874 in that locality exhibit some remarkable irregularities of the bottom of the sea. On the two lines run to the westward from San Diego we find one thousand and fifty-three fathoms, green mud, twenty-eight miles south thirty-six degrees west (S. 36° W.) from Point Loma, and the next sounding is two hundred and three fathoms, rocky, at fifty-three miles south forty-one degrees west (S. 41° W.) from the light, and forty-one miles northeast from the assigned position of this shoal. Then the depth increases to five hundred and sixty-six fathoms, gray sand, twenty-two miles north by east (N. by E.) from the shoal, and nine hundred and eighty fathoms at sixteen miles northwest by west (NW. by W.) from the same point. A depth of one thousand nine hundred and fifteen fathoms, over yellow-brown mud, is reached at thirty-two miles west from the shoal; and this may be considered the eastern edge of the Pacific sub-ocean plateau, for we have two thousand one hundred and seventy-seven fathoms, brown mud, and two thousand one hundred and seventy-eight fathoms, brown mud, sixty-five miles and one hundred and five miles, respectively, to the south and west of the supposed shoal. All the indications point to very great irregularities in depth, and it may not be impossible that some shoal spot should exist.

* For description of the Cortes Bank, see page 69.

On the 11th of April, 1873, Captain Metzgar, of the Pacific Mail steam ship *California*, made, at our request, an examination of this bank. At 1 o'clock a. m., in latitude 31° 43′, longitude 118° 51′, he sounded with ninety fathoms of line and found no bottom; at 2 o'clock a. m., in latitude 31° 38′, longitude 118° 45′, there was no bottom with ninety fathoms of line; and at 10 minutes past 3 o'clock a. m., in latitude 31° 33′, longitude 118° 38′, there was no bottom with ninety fathoms of line. These positions are nearly correct, and checked by previous and subsequent observations for the ship's position.

TABLE MOUNTAIN.

Within Mexican territory and ten miles from the sea-board is the notable landfall of Table Mountain, lying south fifty four degrees east (S. 54° E.), twenty six miles from the light-house at Point Loma. Its geographical position is latitude 32° 20′ 05″, longitude 116° 54′ 17″. The summit of the mountain is flat and the sides are inclined at an angle of forty five degrees with the horizon. The breadth of its top is sixteen hundred yards and its elevation two thousand two hundred and forty four feet above the sea. A conical mountain appears a little west and southward of Table Mountain, but not quite so high; its sides are also inclined forty-five degrees with the horizon. Still further to the west and southward appears an irregularly jagged top mountain, about two-thirds the breadth of Table Mountain and two thousand five hundred and sixty one feet in elevation. The latter mountain has been named Sharp Peak.

These mountains are prominent and noteworthy landmarks, because nothing like them exists on the coast, and they should be visible from fifty to fifty five miles from seaward in good weather. They were remarked by Vancouver, who gives a view of them in his volume of charts. We obtained the accompanying view of them in 1873, when heavy cumulus clouds covered the coast range.

Table Mountain is "La Mesa de la Cena" of Vizcaino, 1602. It is known to the Spanish inhabitants of California as La Mesa Redonda, on account of its almost circular area on top, which is covered with sharp, angular fragments of a reddish rock, whose other characteristics are not given.

Sixteen miles in from the coast-line is the great chain of the coast mountains, which reach three thousand two hundred and ninety feet elevation at Double Peak in Mexico, and three thousand three hundred and eighty six feet at a peak three miles north of the boundary line. In clear weather these mountains should be seen farther seaward than Table Mountain and Sharp Peak.

All the coast land north of Table Mountain is comparatively low, and when a vessel is up with the Coronados the northern point of this table-land bears north by east three-quarters east (N. by E. ¾ E.).

DESCANSO POINT AND MEXICAN POINT.

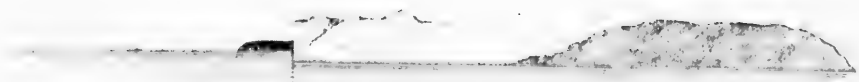
A vessel coming up the Mexican coast on a general course northwest half north to northwest three-quarters north (NW. ½ N. to NW. ¾ N.) may pass all the prominent headlands at a distance of five to ten miles. The Coronados Islands are made out at twenty-five miles, when a vessel is half-way between Point Banda (Todos Santos Bay) and the islets. The deep bight under Table Mountain and Sharp Peak, where the coast recedes five miles to the eastward, is named *Descanso Bay*. At the western limit of this bight is Descanso Point, which is characterized on the chart by a slight hill on the top of the bluff near its extremity. It is in latitude 32° 16′, longitude 117° 01′.

From Descanso Point the coast-line is the edge of a long stretch of mesa running as far north as the boundary line between Mexico and the United States. But for the first thirteen miles this shore line is nearly straight on a northwest three-quarters north (NW. ¾ N.) course to Mexican Point, abreast the Coronados Islands, where the shore changes its trend to north by west three-quarters west (N. by W. ¾ W.) for four and a half miles to the boundary, and continues to nine miles abreast the southern part of San Diego Bay.

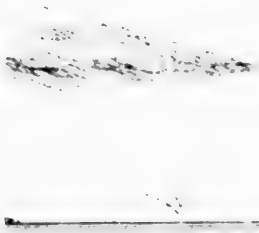
The hills immediately behind this narrow mesa rise to four hundred and five hundred feet, and increase inland. Mexican Point shows out very well to all vessels coming from the southeastward; and when it bears north by west half west (N. by W. ½ W.), distant eighteen to twenty miles, it is fairly well above the horizon. At the same time a remarkable feature is seen on the very edge of the high mesa, where a moderately low, broad, and well-defined crater is seen on the ocean slope.

ıd Dunes.

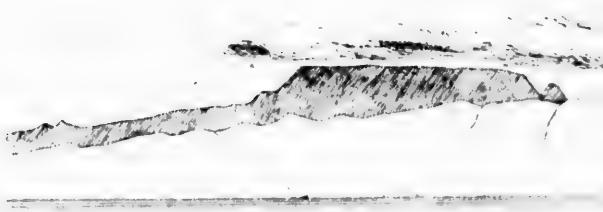
ed Mountain.
arp Peak,
2,561 feet.



Mexican P
N by W. ½



Sugarloaf Rock.



Double Peak, 3,686 feet.

Table Mountain, Mexico,
N. by E. ¼ E., 13 miles, 2,244 feet hi

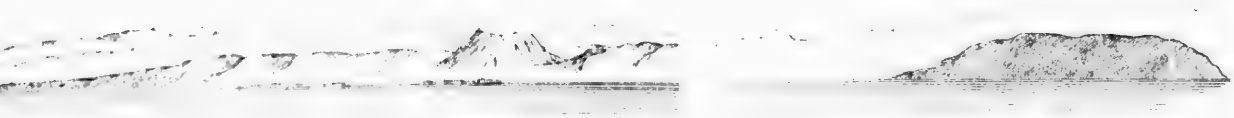
Mexican Point, 5 miles south of Boundary monument.
N. by W. ¾ W., 16¼ miles

Sand dunes.

Mountain, Mexico.
by E. ¼ E., 13 miles, 2,244 feet high.

Red Mountain.

Sharp Peak,
2,581 feet.



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Los Coronados, Mexico, N. W. 13 miles, 674 feet high.

miles, 350 feet high.

NNW., 4 miles, 674 fee

Los Coronados Islands.

Mexican Point, 5 miles south of Mexican Boundary,
N. by W. ¼ W., 14¼ miles

eet high.

Passage.

NNW., 4 miles, 674 feet.

Point Loma as an island,
N. by W. ¼ W., 20¼ miles.

s Islands.

The weather was dark and clouds were hanging over the land when we passed this object, so that no ranges nor distant background could be obtained. But the view then made of it exhibits some of its characteristics. The Coronados then bore northwest half north (NW. ½ N.), distant about sixteen miles, and appeared as two islets, the larger double mass to the southeast and the smaller and double-pointed mass to the northwest.

A good passage-way, seven miles in width, exists between this point and the Coronados Islands, with an average depth of fifteen fathoms. Vessels from the south, bound to San Diego, may safely go inside the islands at night upon the bearing of Point Loma Light elsewhere given.

Mexican Point has no name upon any of the existing charts, and we have given it this name for reference only. Its approximate geographical position is latitude 32° 27½′ north and longitude 117° 07′ west.

LOS CORONADOS.

These islands, belonging to Mexico, lie seven miles off the coast and nearly eight miles south of the boundary between Mexico and the United States. They form a group of high, bold, and abrupt rocks and rocky islets, of which the largest is fifteen miles south by east (S. by E.) from Point Loma. It is nearly two miles in length by one third of a mile in breadth, and lies in a northwest and southeast direction. As seen from the north or south this islet is a wedge shaped mass rising to about six hundred and seventy five feet above the sea, but when seen from the southwest it shows as a long undulating islet with the largest depression near the middle. The surface has some earth upon it, but it is entirely destitute of trees; a few small scrubby bushes exist, and during the rainy season the soil is covered with grass, and a great abundance of gaudily colored flowers show in patches of yellow, purple, and orange. During the dry season all vegetation is withered, and the islet presents a sterile and forbidding appearance. Cacti and similar plants grow among the rocks.

When the island bears north by west half west (N. by W. ½ W.) the conical outline is slightly marred by a shoulder of the north part of the island showing on the west slope. On this bearing the northwest islet shows a somewhat similar figure, and the two rocky islets lie between them, but nearer to the largest islet. A little to the east of this largest islet is seen the faint outline of Point Loma as a low flat islet. When the southeast point of the islet bears northeast by north half north (NE. by N. ½ N.) the northwest islet is a regular pyramid, the two rocky islets are nearer the largest, and Point Loma is faintly seen as a low flat islet just west of the middle islet.

The north end of the large islet has straggling kelp around it and some rocks close to it. There is a sunken rock close under the south end. The soundings along the east face of the islet range from eight to sixteen fathoms, and there is said to be excellent anchorage on this side of the island in ten to fifteen fathoms of water over sandy bottom. There is only one landing place, and even there the ascent is difficult for fifty feet, and thence easy to the crest, which is half a mile distant.

The second prominent islet is a huge barren mass of rock, three hundred and fifty feet high and three-quarters of a mile long northwest and southeast. It lies north fifty-eight degrees west (N. 58° W.), three miles distant from the largest islet. When seen from the south-southeast and and north northwest it appears as a regular pyramid, but when seen from the west-southwest it is broadened out with an irregular outline and the higher, double-headed part towards the southeast. There is very deep water close around this islet, soundings of forty to fifty fathoms being found on all sides over a bottom of sand, coral, and broken shells.

Off the northwest part of the largest islet, and in the general direction towards the second islet, lie two smaller ones, or rather two great masses of rock. The larger and higher one is nearly half a mile in extent and fifty feet high. It lies about one mile southwest (SW.) from the north point of the largest islet. It has deep water around it, with kelp on the inner side. When the largest islet bears north by west half west (N. by W. ½ W.), this larger rock shows to the westward of the smaller rock as a flat pyramid; but when the southeast point of the largest island bears northeast by north half north (NE. by N. ½ N.), three miles distant, this larger rock appears as the inner one, and is irregular in outline, having its higher end towards the west. The smaller rock is comparatively low, and lies about half a mile westward of the north point of the largest islet. Both these rocks were favorite resorts of the enormous sea-elephants before they were exterminated. Between these two rocky masses and the largest islet the bottom is foul and marked by kelp.

There is a two-miles wide passage between the northwest islet and the rocky masses off the largest or southeast islet. The depth ranges from eighteen to forty fathoms, but no vessel is called upon to use this passage.

Between the islets and Mexican Point, the bottom is quite regular, and the depths range from eighteen to twenty fathoms at the islets to ten fathoms within a mile of the shore, with bottom of sand and shells, and steam-ships frequently use this passage.

Coming from the south this group affords a good mark in making San Diego when Table Mountain is clouded, although before being up with them Point Loma shows distinctly as a low flat islet.

At night a vessel approaching San Diego from the southward will see the Point Loma Light from ten to thirteen miles before being up with them, and when it is brought to bear northwest by north two-thirds north (NW. by N. ⅔ N.) a course for it will carry her past the Coronados midway between the main shore and the southeastern islet.

The sketches give a general idea of the group from different points of view.

The geographical position of the highest point of the largest islet, as determined by the Coast and Geodetic Survey, is:

Latitude	32	23	46	north.
Longitude	117	14	42	west.
Or, in time	7h	48m	50s.8	

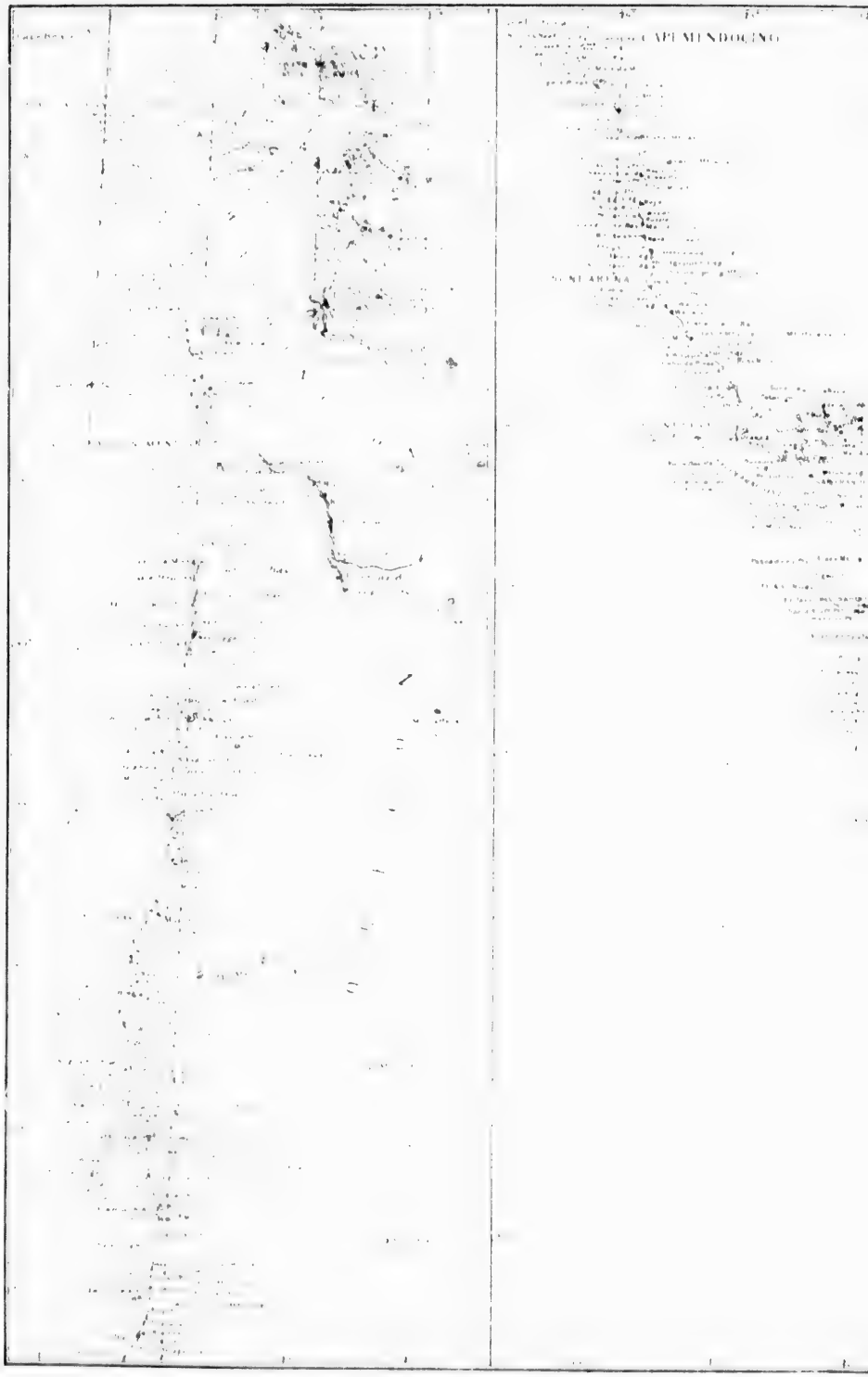
Deep-Sea Soundings.—Several off-shore soundings have been taken near this group, and especially on the northwest prolongation of the two principal islets. From the southeastern or largest islet we have the following bearings and distances of these soundings and the character of the bottom. The observations were made by U. S. steamer *Tuscarora*:

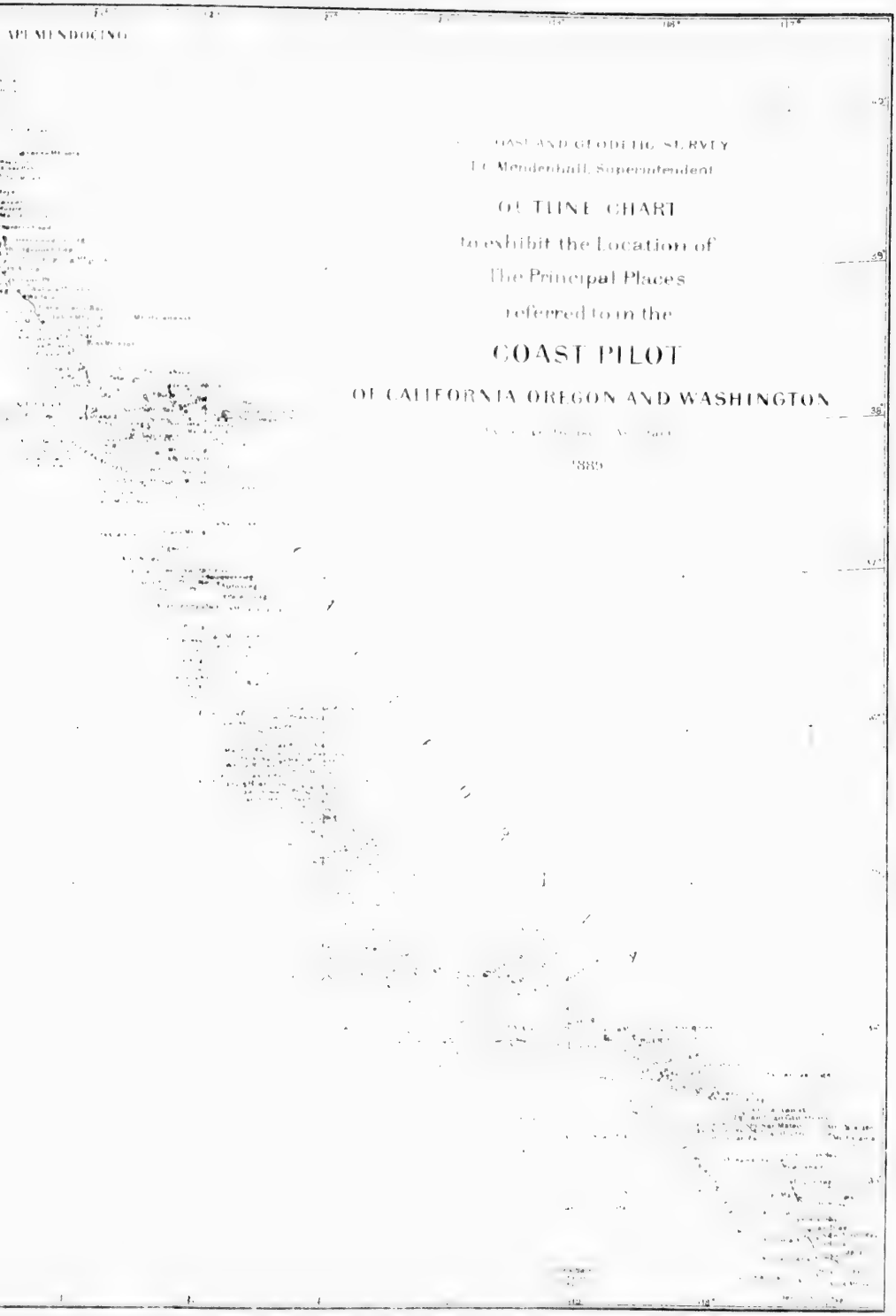
Date.	Bearings.	Distance.	Depth.	Temperature, Fahr.		Character of bottom
				Surface.	Bottom.	
		Miles.	*Fathoms.*	°	°	
Jan. 8, 1874	N. 48 W.	9	71	58.2	.....	Gray and black sand and broken shells
Jan. 8, 1874	N. 50 W.	10	355	58.2	.....	Dark mud with fine sand
Jan. 8, 1874	N. 66 W.	11	622	57.8	38.4	Dark mud with fine sand
Dec. 30, 1873	N. 66 W.	15	887	59.8	38.0	Dark mud
Dec. 30, 1873	N. 86 W.	12	579	58.0	38.8	Dark mud.

The soundings on the French chart 1997, edition of 1867, from Los Coronados to the Cortes Bank, are erroneously given. They should have the sign of "*no bottom*" to each.

Los Coronados were discovered by Juan Rodriguez Cabrillo on the 27th September, 1542, and Ferrelo, his pilot, describes them and their position very well—"three uninhabited islands," which they named Islas Desiertas, or the Desolate Islands. They obtained their present designation from Vizcaino, who named them in 1602 in honor of Francisco Coronado, governor of the province of Xalisco under Cortes. On Vizcaino's chart, however, they are designated Islas de San Martin.

Cabrera Bueno calls them the Islands of San Martin, with some very small Farallones.


CAPE MENDOCINO


APE MENDOCINO
COAST AND GEODETIC SURVEY
E. Mendenhall, Superintendent
OUTLINE CHART
to exhibit the Location of
The Principal Places
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COAST PILOT
OF CALIFORNIA OREGON AND WASHINGTON
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PACIFIC COAST OF THE UNITED STATES.

CALIFORNIA.

The name California is first found in the worthless romance "Las Sergas of Esplandian," the son of Amadis of Gaul, written by Garcia Ordonez de Montalvo, the translator of the Amadis. It was first printed in 1510, with editions in 1519, 1521, 1525, 1526 (two), 1575, 1587, and the recent reprint of 1857.*

The name appears in numerous passages, of which the following are given:

Know that, on the right hand of the Indies, very near to the Terrestrial Paradise, there is an island called California, which was peopled with black women, without any men among them, because they were accustomed to live after the fashion of Amazons.

In this island called California are many Griffins, on account of the great savageness of the country and the immense quantity of wild game found there.

Now, in the time that those great men of the Pagans sailed [against Constantinople] with those great fleets of which I have told you, there reigned in this land of California a queen, large of body, very beautiful, in the prime of her years, etc.

The name California next occurs in the memoirs of the conquistador, Bernal Diaz del Castillo, who served with Cortes in the conquest of Mexico. He writes that "Cortes again set sail from Santa Cruz and discovered the coast of California." Here Cortes remained for some time, disheartened at the want of success of his various expeditions. The viceroy, Mendoza, dispatched a vessel under the command of Ulloa, with letters to Cortes.

Ulloa had a most favorable voyage, and soon arrived in the harbor where Cortes lay at anchor. The letters of his wife and those of his children, and of the viceroy, had so much effect upon him that he gave the command of his vessel to Ulloa, embarked for Acapulco, and, when he had arrived here, he hastened to Quauhnahuac, where his wife resided. * * * Shortly after, also, the troops arrived which had been left behind in California.

After a few months' repose Cortes sent out a more considerable expedition under command of Ulloa.

This armament left the harbor de la Natividad in the month of June of one thousand five hundred and thirty and so many years—I forget the exact year.

The California referred to above is the peninsula of that name, generally known as Lower California, and the date 1535. They are the only times in which Diaz uses the name. (Cap. C. C.)

In 1539 Francisco de Ulloa determined Lower California to be a peninsula. This fact appears to have been subsequently forgotten, for the "West Indische Spieghel," a quaint old Dutch description of America and of Spanish cruelties, published in 1624, has a map representing California as an island, terminating at the northwest at Cape Blanco. The English translation, published in 1671, reproduces the text and the map. And about 1675 it was called the Ilas Carolinas, in honor of Charles II of Spain. In De Fer's atlas, 1709, California is laid down as an island as far north as 45° at the latest date, 1726. Many other authorities considered it an island.

The name California was gradually used to designate the region from the Gulf of California to the mythical "Straits of Anian."

* The full title of the book is "Las Sergas del Muy Esforzado Cabalero Esplandian hijo del excelente re Amadis de Gaula."

The country from latitude thirty-eight degrees northward was called New Albion by Sir Francis Drake in 1579.

In recent times the region north of San Diego was called Alta California, and that to the southward, Baja California.

GENERAL DESCRIPTION OF THE PACIFIC COAST TO THE STRAIT OF JUAN DE FUCA.

From the southern boundary of California, in latitude 32° 32′, longitude 117° 08′, to Point Arguello, in latitude 34° 34′, longitude 120° 38′, the coast runs west-northwest two hundred and twenty-five miles, and off this stretch lie the Santa Barbara Islands; from Point Arguello to Cape Mendocino, in latitude 40° 25′, longitude 124° 22′, it runs northwest five hundred and twenty-five miles, embracing the Bay of Monterey and the Gulf of the Farallones, with the entrance to San Francisco Bay; and from Cape Mendocino to Cape Flattery, in latitude 48° 23′, longitude 124° 44′, it runs north-northwest four hundred and eighty miles, embracing Humboldt Bay, the great reefs of Point Saint George and Cape Orford, the entrance to the Columbia River, and the Strait of Juan de Fuca.

THE COAST OF CALIFORNIA.

Approaching the coast of California from the southward, the first landmarks are the Coronados Islands and the well-defined outlines of Table Mountain and its conical neighbor, Sharp Peak. The immediate coast southward of San Diego Bay is a table-land of moderate height, stretching well back, with a gentle slope to the foot-hills, whence the land rises rapidly. It is well represented in the accompanying sketches.

The *monument* marking the western initial point of the boundary between Mexico and the United States is on the table bluff ten miles northeast by north two-thirds north (NE. by N. $\frac{2}{3}$ N.) from the Coronados, and eleven miles southeast half east (SE. $\frac{1}{2}$ E.) from Point Loma light. It is about forty-one feet above the sea, and directly to the north of it the mesa falls to the low marshy land south of San Diego Bay. It is an obelisk of white marble, about twenty feet in height, resting upon a pedestal. It stands near the edge of the bluff, about two hundred yards from the sea-shore, and is plainly visible from the water. Its geographical position, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	32	31	53.46	north.
Longitude	117	07	32.37	west.
Or, in time	7h	48m	30s.2	

This point of bluff is named Punta de Arena on the Spanish charts.

The height of the land at the monument is forty-five feet at mean low water, and one mile east of the monument there is a stone mound three hundred and sixty-five feet above the sea.

From the boundary the coast is low and flat, running north by west for about seven miles; thence curving gradually to the westward until it is nearly east and west at the entrance to San Diego Bay. The interior of the country is marked by high mountains, forming part of the great chain extending the whole length of the peninsula of Lower California.

SAN DIEGO BAY.

Point Loma.—Whether approaching it from the southward or westward, Point Loma is first raised as a flat-topped island, and even when well up with it this isolated headland stands out sharply defined, because the country behind it is comparatively low. It is the southern part of the western boundary of San Diego Bay and the termination of a remarkable narrow spur of coarse, crumbling sandstone, which rises south of Puerto Falso, or False Bay, and west of the Bay of San Diego, to the height of three hundred feet; after stretching south for about five and a half miles, gradually increasing in height to four hundred and fifty-seven feet, it terminates abruptly on its sea face abreast the bar at the entrance to the bay. It is covered with coarse grass, cacti, wild sage, and low bushes.

The Bay of San Diego lies to the eastward of the ridge of Point Loma, with the entrance indistinguishable until close up with it.

Next to San Francisco, no harbor on the Pacific coast of the United States approaches in excellence that of San Diego. The marks for distinguishing it are quite notable; there are no outlying dangers; the entrance is easily approached; heavy southeast storms are unusual; and twenty

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feet of water can be carried over the bar, the channel across which is well buoyed. There is less rain, fog, thick haze, and more clear weather in this section of the coast than at all points to the northward, and the approaches are more readily distinguished on that account.

*Ballast Point.**—On the eastern side of Point Loma ridge, at one and one-quarter miles from the southern extremity, there is a low, narrow, bowlder point, stretching one-third of a mile to the north-northeastward, and forming a natural breakwater for the protection of the bay. This is Ballast Point, forming the west side of the entrance to the bay. In December, 1885, there were two large white one-story houses at the outer end of the point, two others at the inner part of it, and six or seven others on the rise of the ground inside the point at twenty or thirty feet above the level of the bay. It is proposed to place a light-house on this point.

Zuniga Point.—Directly abreast and northeast of Ballast Point, at a distance of one-quarter of a mile, there is a low sandy point, which is the western extremity of the low sandy shore that sweeps eastward for two or three miles and then southeastward for six or seven miles, forming the ocean boundary of the Bay of San Diego. The entrance to the bay is between Ballast Point and this opposite low point, which has been named Zuniga Point for reference.

From Ballast Point the bay runs north by west for about a mile and a half; thence it curves gradually to the eastward for three miles to San Diego (formerly New San Diego); thence southeast seven miles to National City and the head of the bay.

The eastern side of the entrance to San Diego Bay is low and flat, being at its highest point only twenty-four feet above the sea. It is covered with thick brush and grass. It is the northwestern expanded part of the long, low peninsula forming the ocean boundary of the bay towards the southwest. This part is about three miles long and one and a half miles wide, narrowing suddenly to less than a hundred yards in places hence to the head of the bay. This expanded part of the peninsula is locally called "The Island," although not actually cut off, and its northernmost point inside the bay is named Punta de San Estevan. The ocean shore of the narrowest part is called "Costa Brava" on old Spanish charts.

The eastern part of this island has been laid out as a town, named *Coronado Beach*, and a large hotel has been built near the outer beach, in a position bearing almost exactly east-northeast, distant three and a quarter miles from the light house. This is a good landmark for small steamers from the southward following the shore line in thick, hazy weather.

The bay has the appearance of an extensive body of water, but the greater part of the area has less than three fathoms, and especially beyond the town of San Diego, where four-fifths of the area has less than ten feet o water. Through the bay there is a ten-to-three fathom channel nearly to the head, and averaging one-quarter of a mile in width. The tidal area of the bay is less than twenty five square miles.

The *San Diego River* formerly entered the northernmost part of the bay, about three miles north from Ballast Point, and abreast of the old town and presidio of San Diego. One mile inside of Ballast Point, and on the same side of the bay, is the site of the old settlement La Playa (The Beach). There were no houses upon it in 1884. Beyond La Playa, in the northern curve of the shore, lie extensive shoals formed by the sand and sediment formerly brought down by the river. On the old Spanish charts† the river is shown as emptying into this bay, but at an earlier, and also at a later, period it must have entered Puerto Falso, because the latter has evidently been nearly filled up by it. The waters of the river entered into False Bay before 1835, because in that year the river changed its course and emptied into San Diego Bay. Several appropriations have been made by Congress to turn and keep the channel of the river to its original bed into False Bay.

Zuniga Shoal.‡—Outside of Ballast Point, abreast the eastern side of Point Loma and parallel therewith, at the distance of two-thirds of a mile, is the western edge of the Zuniga Shoal, which makes out one and a half miles south by east (S. by E.) from Zuniga Point to three fathoms of water. For one mile there is six feet and less of water on it, and in fact there is a bare patch

* Punta de Guiranos, or Punta de los Guijarros of Spanish charts. On Vancouver's chart, Punta de Guiranos, after Dalrymple. Cabrera Bueno calls it the Point of Large Pebbles.

† Dalrymple's copy of Spanish charts of 1782, published 1789; verified by Vancouver, 1792.

‡ Named by Vizcaino in 1602. Don Caspar de Zuniga, Count de Monterey, dispatched the expedition. On Vancouver's chart it is called Burros de Zuniga; in his narrative, Baros de Zooniga. Dalrymple's sketch (1782) calls the shoal Baros de Zuniga. Cabrera Bueno first calls it Zuniga.

visible at low water. It is a mile broad at its base on the shore of the peninsula, narrowing to one-third of a mile abreast the extremity of Point Loma. This great sand bank is doubtless formed by the movement of the material from the sandy shore that lies to the southward. The latest examinations indicate that this shoal is being formed further to the southward. A swash channel, having six feet of water in it, lies close along the beach whence the shoal projects.

The Bar of San Diego Bay.—The bar at the entrance to San Diego Bay is formed by the movement of the tail of the Zuniga Shoal towards the extremity of Point Loma. Within the four fathom curve it is a narrow ridge of sand one eighth of a mile in breadth and half a mile long, lying northwest and southeast. The middle of the bar lies east one-quarter south (E. ¼ S.) three quarters of a mile from the extremity of Point Loma, southeast by east half east (SE. by E. ½ E.) a little more than three-quarters of a mile from the light, and in range with the extremity of Ballast Point and La Playa, one and one third miles from the former. It is about three hundred yards across on a north course between the four fathom lines, and twenty feet of water can be carried over it. The surveys of 1856 and 1878 indicate that an appreciable decrease had taken place in the depth of water on the bar. There had not been any decrease between 1792, when Vancouver examined it, and 1851-'56, when the depth was twenty-two feet.

San Diego Bar.—It is reported as the experience of the steam-ship captains on this coast that the bar of San Diego very rarely breaks. Only one case had been made known to us before the heavy winter of 1888 '89, when it broke several times. This may have been in part owing to the fact that the tail of the great kelp-field was torn away, leaving the Pacific swell free movement to the bar.

Kelp and Dangers.—The great compact field of kelp lying one to one and a half miles off the western shore of Point Loma out to fifteen fathoms of water, and stretching two miles south of the point, is a safe guide to the navigator in thick weather in approaching San Diego from the north. The depth of water on its outer edge is fifteen fathoms to the tail. There is a narrow lane of open water between the inner edge of this kelp and the shore, with four or five fathoms close along the edge, but with two reported dangers. Throughout the whole field no known dangers exist, and the depth ranges from fourteen to four fathoms. Eastward of Point Loma and abreast the low sandy shore there [illegible]

Kelp.—Cabrera describes the great bank of rock-weed which vessels passed through with twelve to fourteen fathoms of water. In the storms of the winter of 1888 '89 this great field of kelp was completely [illegible]

New Hope Rock.—The San Diego pilots report the existence of a pinnacle or bayonet rock, ten or twelve feet under water, and breaking in a moderate westerly swell. It lies about half a mile off the western shore of Point Loma peninsula, just inside the great kelp field, in the lane of open water, and two miles northwest (NW.) from the [illegible]

On the chart there are no soundings to indicate the danger, the nearest sounding to the assigned locality being six and three quarters fathoms. In the kelp field are soundings of four fathoms, with deeper water around.

On a photolithograph chart of San Diego Bay, on a scale of one-twenty thousandth, issued by the Coast and Geodetic Survey in 1880, the name New Hope Rocks is applied to two eleven feet lumps lying within the three fathom curve three quarters of a mile west by north from Point Loma Light.

A break has been reported just inside the kelp and bearing about west three quarters south (W. ¾ S.) one and one-quarter miles from the light. The rock has not been found, but irregular rocky bottom, with two fathoms less water than the chart gives, has been discovered. (April, 1874.

Ballast Point Shoal.—Just inside of Ballast Point, and about two hundred yards northwest by north (NW. by N.) from it, there is the southern tail of a long, narrow, curving shoal which occupies the middle of the water way between the eastern shore of the Loma and the western shore and low water line of the island. This shoal is about two hundred yards wide, runs about northward for three-eighths of a mile, and then curves sharply to the north by east, with a strong tendency to stretch over and join with the shoal bank on the eastern side of the bay at this place. There is as little as twelve feet of water near the buoy, and at a little over half a mile north northeast from Ballast Point the deepest water is found across the shoal. The chart gives twenty four feet.

The deep water channel is between this shoal and the Point Loma shore. There is a depth of eleven fathoms between it and Point Loma, and nine and seven fathoms between it and the western shore. But the change of direction of this channel around Ballast Point is so short and sharp and

the currents so strong that vessels can not use this channel. This shoal has black buoy No. 1 upon its shoalest part.

Inside of Ballast Point Shoal there is no danger, but a capital channel, well buoyed out for the next seven or eight miles.

Many changes are being made in the wharfage of San Diego and of National City, and other important additions are contemplated. A local knowledge of the different wharves or the services of a pilot is needed to run to a berth. The wharves have been planned to run out to twenty six feet of water at the lowest tides.

At the narrowest part of the channel opposite San Diego a wharf has been constructed on the southern or Coronado Beach shore for ferry purposes.

POINT LOMA LIGHT-HOUSE.

This primary sea-coast light is less than half a mile from the southern end of the point and situated upon its highest part, four hundred and twenty four feet above the sea. The building consists of a stone dwelling of one and a half stories, with a low round tower of plastered brick, rising six feet above the roof to the base of the lantern. The focal plane of the light is four hundred and sixty-two feet above the sea. The light is of the third order of Fresnel, *flashing red and white, alternately, at intervals of* 1 *minute*, exhibited (since November 15, 1855) from sunset to sunrise, and illuminates the entire horizon. When a vessel is in the channel outside of Ballast Point she does not see the full brightness of the light on account of its height and nearness. In clear weather it should be visible from a height of—

10 feet above the sea, at a distance of 28.3 miles.
20 feet above the sea, at a distance of 29.8 miles.
30 feet above the sea, at a distance of 30.9 miles.
60 feet above the sea, at a distance of 33.5 miles.

The geographical position of the light house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	32	40	13.55 north.
Longitude	117	14	37.84 west.
Or, in time	7h	48m	5s.5

The magnetic variation was 13° 36′ east in 1885, with a yearly increase of 1′.5. The variation of the compass will reach its easterly maximum about 1895.

From the light we have the following bearings and distances to prominent objects:

Los Coronados, Southern Islet	S. 13	E.	Distance, 15 miles.
Point La Suen	N. 46¼	W.	Distance, 71 miles.
Point Fermin Light house	N. 54	W.	Distance, 81 miles.

From the light-house the islands of Santa Catalina, seventy miles distant, and San Clemente, fifty eight miles distant, are distinctly visible in clear weather.

The English Admiralty chart No. 2461, with corrections to March, 1865, has the Point Loma Light erroneously located on False Point, about seven miles northward of its true position. In the "Light-Houses of the World," by Findlay, 1868, it is placed "*near Point Loma*," etc.

The light-house on the highest part of the Loma is frequently hidden by the high fogs when the lower parts are visible; therefore, to increase the usefulness of the light it has been determined by the Government to place it on the southern extremity of the point, of which due notice will be issued.

We have seen the light when the vessel was four miles south of Los Coronados.

BEACONS, BUOYS, AND OTHER DAY AND NIGHT MARKS, FOR THE ENTRANCE TO SAN DIEGO BAY, ARRANGED IN THE ORDER IN WHICH THEY ARE PASSED BY VESSELS ENTERING FROM SEA.

The Outside Bar Buoy.—This is a *second-class whistling buoy, painted black and white perpendicular stripes*, placed in eighty-six feet of water, hard sandy bottom, near the south end of the kelp-field, two and a half miles south of the extremity of Point Loma, bearing south three-quarters east (S. ¾ E.) from the light-house. The Coronado Hotel bears north thirty degrees east (N. 30° E.), distant four and five-eighths miles. The house on the outer end of Ballast Point is just open past the southeast point of Loma, on the line of the bell buoy and red buoy. The edge of the kelp

does not cross the course. To the next buoy the course is north, and distance one and five eighths miles.

The whistling buoy is sounded by the action of the waves, and in an ordinary swell will whistle about twenty-five or thirty times per minute.

The *bell buoy* (replacing the automatic whistling buoy since May 7, 1888) is placed in seven and one half fathoms of water, over hard, sandy bottom, on the eastern edge of the great kelp field. It is one and one-sixth miles south twenty-nine degrees east (S. 29° E.) from the light-house. From it the west tangent to Point Loma bears north forty-five degrees west (N. 45° W.), distant seven eighths of a mile; the bar buoy north ten and one half degrees east (N. 10½° E.), distant five eighths of a mile; the large hotel on the Coronado Beach north forty-six degrees east (N. 46° E.), distant three and one-fourth miles. This buoy and the two bar buoys are in range. From this buoy the automatic whistling buoy at the tail of the kelp field bears south, distant one and five-sixths miles.

The *bar buoy* is five sixths of a mile south fifty-nine degrees east (S. 59° E.) from the light-house. From it the south tangent of Point Loma bears almost exactly west, distant a little over five eighths of a mile. The inner bar buoy bears north eight degrees east (N. 8° E.), distant three-eighths of a mile; the whistling buoy outside bears south ten and one half degrees west (S. 10½° W.), distant five eighths of a mile.

The *inner bar buoy* is seven tenths of a mile south eighty-five degrees east (S. 85° E.) from the light-house. From it the mid-channel course past Ballast Point is north twenty-five and one-half degrees west (N. 25½° W.) and the point distant one and one eighth miles. The bar buoy bears south eight degrees west (S. 8° W.), distant three eighths of a mile.

Point Loma Light Station.—This is a dark gray tower, thirty-five feet high, surmounted by a red lantern, rising out of keeper's house, on the highest part of the point, about half a mile from its extremity. It shows a *third-order* [illegible] *every minute.* Ballast Point bears [illegible] degrees east (N. 12° E.), distant a little less than one mile.

BUOY AND BEACONS MARKING CHANNEL [illegible] SAN DIEGO BAY, ARRANGED IN THE ORDER IN WHICH [illegible] ENTERING.

A *spar buoy*, painted [illegible], with [illegible], marks the outer end of the middle ground just inside of Ballast Point at three and a quarter fathoms [illegible] to mark the south end of the Middle Ground Shoal.

A *can buoy*, painted [illegible] stripes, perpendicular, in eighteen feet of water, over sandy bottom, marks the upper end of the middle ground inside Ballast Point.

Buoy No. 1.—This is a *second class can buoy, painted black, numbered* 1, and placed in fourteen feet of water on the Ballast Point Shoal, whose southern tail reaches within two hundred yards of Ballast Point, from which it bears northwest by north, as already described. From Buoy No. 1 Ballast Point bears southeast one eighth south (SE. ⅛ S.), distant one-quarter of a mile.

Beacon No. 2.—This is a *pile beacon, crowned by a box painted red, numbered* 2, and placed on the starboard side of the channel opposite La Playa in ten feet of water. From it Ballast Point bears south one quarter east (S. ¼ E.), distant one mile, and Beacon No. 1 south three quarters west (S. ¾ W.), distant a little more than three quarters of a mile. After passing Beacon No. 1 steer between Beacons Nos. 2 and 3, and when opposite La Playa vessels can anchor in six to nine fathoms over hard sand.

Beacon No. 3.—This is a *pile beacon, crowned by a box painted black, numbered* 3, and placed in nine feet of water over hard sandy bottom on the port or north side of the channel. From it Ballast Point bears south [illegible] west, distant [illegible] miles, and Beacon No. 2 southeast five eighths east (SE. ⅝ E.), distant one quarter of a mile.

Here the channel turns very suddenly to the east, and care should be taken to keep in mid-channel if bound to San Diego or National City, following the beacons on the starboard hand.

Beacon No. 4.—This is a *pile beacon, crowned by a box painted red, numbered* 4, and placed in nine feet of water over hard sandy bottom on the starboard side of the channel. From it Beacon No. 2 bears southwest by south (SW. by S.), distant a little more than two thirds of a mile, and Beacon No. 3 southwest three-quarters west (SW. ¾ W.) the same distance.

Beacon No. 6.—This is a *pile beacon, crowned by a box painted red, numbered* 6, and placed in nine feet of water over hard sandy bottom on the starboard side of the channel. Inside this

beacon the bottom is bare at low water. From it Beacon No. 4 bears southwest (SW.), distant one-half mile, and Beacon No. 3 bears southwest half west (SW. ½ W.), distant one and one-quarter miles.

Beacon No. 5.—This is a *pile beacon, crowned by a box painted black, numbered 5,* and placed in nine feet of water over soft muddy bottom on the port side of the channel, nearly opposite Beacon No. 6, which bears from it south by east one-quarter east (S. by E. ¼ E.), distant one-third of a mile. Beacon No. 4 bears south-southwest (SSW.), distant three-quarters of a mile, and is nearly in range with Beacon No. 1.

Beacon No. 7.—This is a *pile beacon, crowned by a box painted black, numbered 7,* and placed on the port side of the channel in nine feet of water over soft muddy bottom on a small shoal. From it Beacon No. 5 bears west one-eighth south (W. ⅛ S.), distant one and two-third miles, Beacon No. 6 west by south one quarter south (W. by S. ¼ S.) the same distance, and Point Loma Light southwest three-quarters south (SW. ¾ S.).

Beacon.—*A single pile beacon, crossed by boards painted red,* has been placed on the south shore off Punta de San Estevan,* in fourteen feet of water, about midway between Beacons No. 6 and No. 7, and about two hundred yards from the east land. The channel lies close under it. From it Point Loma Light bears southwest by south half south (SW. by S. ½ S.) three and a half miles.

Beacon No. 8.—This is a *pile beacon, crowned by a box painted red, numbered 8,* and placed in ten feet of water on the starboard side of the channel off Punta de San Juan.* From it Beacon No. 7 bears northwest (NW.) distant one and one-third miles, and Point Loma Light southwest by south (SW. by S.).

Beyond Beacon No. 8 the bay expands to nearly two miles in width and the ship channel narrows and decreases in depth; but good water can be carried to the end of the railroad wharf at National City, three and one-third miles from San Diego wharf, in a general southeast by east direction. The channel keeps within a quarter or half a mile of the northern shore, which is low, cut by three valleys, and bordered by a broad low-water beach.

The channel from San Diego to National City is marked by *two red spar buoys* on the starboard hand (in entering) and *two black spar buoys* above them on the port side of the channel. The *red* spar buoys are in twenty-three feet of water, over sandy bottom, and are placed to keep vessels clear of the south middle ground.

The lower *black* spar buoy is in nineteen feet of water, over sandy bottom, and is placed on the channel side of the north middle ground.

The upper *black* spar buoy is in twenty-six feet of water, over sandy bottom, and is placed near the edge of the channel, off the mouth of Las Chollas Creek. A shoal runs off from the mouth of this creek to a considerable distance. Beyond the spar buoys are:

South Middle ground Beacon.—This is a *single pile beacon crossed with boards* and *painted* with *red and black horizontal stripes.* It is placed in thirteen feet of water on the northwest tail of a middle ground. It marks a twelve foot spot, and vessels can pass on either side of it, but the channels are not broad, although carrying nearly four fathoms of water.

The following official bearings are given to locate this beacon: Point Loma Light-house bears southwest by west five-eighths west (SW. by W. ⅝ W.) and the railroad wharf at National City southeast by east one quarter east (SE. by E. ¼ E.). This would place the beacon one and one-eighth miles southeast one quarter east (SE. ¼ E.) from San Diego wharf.

North Middle-ground Beacon.—This is a *single pile beacon crossed with boards* and *painted* with *red and black horizontal stripes.* It is placed one quarter of a mile from the north shore in twelve and a half feet of water to mark a twelve-foot shoal patch off the mouth of the valley of Las Cholas. Vessels can pass on either side of it, but the channels are contracted; the depth can not be given, as there have been important changes since the old surveys.

The following bearings are given in the official list to locate this beacon: Point Loma Light-house bearing southwest by west five eighths west (SW. by W. ⅝ W.), and the railroad wharf at National City southeast half east (SE. ½ E.), distant one and three quarter miles. This would place it one and a half miles southeast by east half east (SE. by E. ½ E.) from the wharf at San Diego.

Beacon No. 9.—This is a *single pile beacon painted black* and placed a little over one-quarter of a mile from the north shore in thirteen feet of water on the north side of the channel and nearly one mile east-southeastwardly from the North Middle-ground Beacon, and is to be left on the port hand in entering.

* The name given to this point on old Spanish charts.

The following official directions have been published to locate this beacon: Point Loma Light house west by south three-quarters south (W. by S. ¾ S.), and the railroad wharf at National City southeast by south (SE. by S.). This places it nearly one mile from the railroad wharf.

Beacon No. 10.—This is a *single pile beacon painted red*, placed in thirteen feet of water on the southwest side of the channel and on the edge of the great flats which extend hence southwestward to the narrow sand-dune strip of the peninsula. It is to be left on the starboard side in entering.

The official location gives the bearing of Point Loma Light house west by south one-quarter south (W. by S. ¼ S.), and the railroad wharf at National City southeast by east (SE. by E.). This would place it a trifle over three quarters of a mile from the railroad wharf.

Beacon No. 12.—This is a *single pile beacon painted red*, placed in thirteen feet of water on the west side of the channel and on the edge of the flats hence to the peninsula. It is to be left on the starboard side in entering. It is almost directly off the railroad wharf at National City, and a trifle over one-quarter of a mile distant therefrom. The following official bearings locate it: Point Loma Light house west by south (W. by S.), and the railroad wharf east southeast (ESE.). The old survey gives nineteen feet of water in the channel.

All of these beacons are placed so near together and mark the channel so plainly that any further sailing directions may seem superfluous; but in the absence of a harbor chart succinct and condensed directions may be useful and will be given after the outside Sailing Directions.

Additional Aids to Navigation.—Between the black beacons Nos. 3 and 5 a single pile "*diamond*" *beacon*, painted *black*, is placed on the port side of the channel in six feet of water. From it No. 4 red beacon bears southeast by south one-half south (SE. by S. ½ S.) and No. 6 red beacon bears east by north one-quarter north (E. by N. ¼ N.).

On the starboard side of the channel, between the red beacon No. 6 and the red diamond beacon, there is placed, in six feet of water, a *single pile "double-cross"* beacon painted *red*. From it the red beacon No. 6 bears southwest by west seven-eighths west (SW. by W. ⅞ W.) and No. 5 black beacon bears west three-eighths north (W. ⅜ N.).

On the port side of the channel on the edge of Dutch flat, between black beacons Nos. 5 and 7, a *single pile "double-cross"* beacon painted *red* is placed in five feet of water. From it black beacon No. 5 bears west by south one-quarter south (W. by S. ¼ S.) and No. 8 red beacon bears southeast by east one-quarter east (SE. by E. ¼ E.).

The following beacons further mark the curving of the channel when approaching San Diego:

A *red* day beacon placed a little over one and a half miles west by south one eighth south (W. by S. ⅛ S.) from the northern pier of the city of San Diego, and a *black* day beacon placed one and one-tenth miles west from the same pier.

Vessels entering San Diego Bay do so either for anchorage to avoid southeasters, or in the regular course of business. If for temporary anchorage only, they go in as far as La Playa, one mile inside of Ballast Point. Trading vessels and steamers pass into the bay five and one-eighth miles inside Ballast Point to the new wharves at San Diego, or seven and a half miles to the railroad wharf at National City.

When inside the harbor vessels are perfectly safe; but old navigators have reported that during very heavy southerly weather the kelp is torn from the great field and driven into the bay in such masses as to force vessels to drag their anchors off La Playa. We have never known such a case, and doubt if a vessel with proper attention and good ground tackle could suffer from such cause. Certainly there is not reach enough for the wind to raise a swell, and the holding ground is excellent. Some swell will come through the narrow entrance, because in heavy southeast storms the sea breaks over Ballast Point.

SAILING DIRECTIONS.

Vessels coming from the northwest make the ridge of Point Loma as a long flat-topped island when about twenty-five miles distant. This appearance is occasioned by the bay to the southward, by the low land to the northeast, and by the Puerto Falso at the north.

The great kelp field off the west shore of Point Loma has already been described; its western edge marks the line where the depth of water changes quite suddenly from about twenty to ten fathoms.

Vessels from the northward, approaching the south end of Point Loma along the outer or western edge of the kelp, should pass through a partial opening in it abreast of the extremity of

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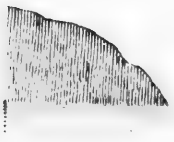

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Point Loma Light-House,
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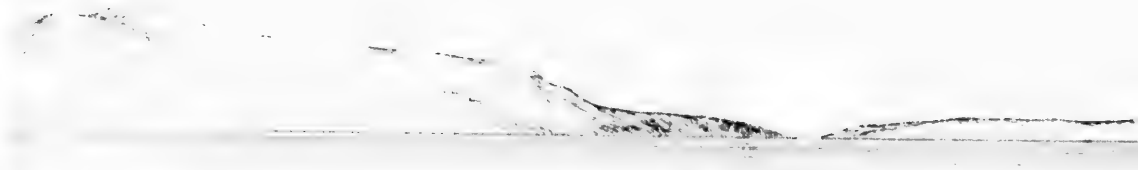

Point Mediaños.

False Bay.

Table
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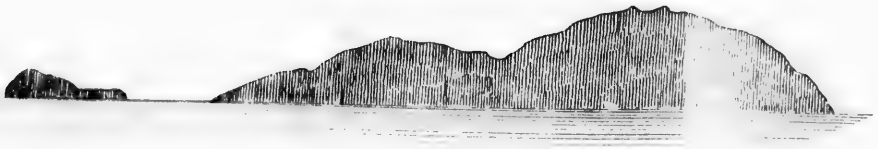
San Onofre Mountain, E. by S. ¾ S.,



Los Coronados Islands, Mexico, NNE. ¼ E., 2¼ to 3 miles, 674 feet high

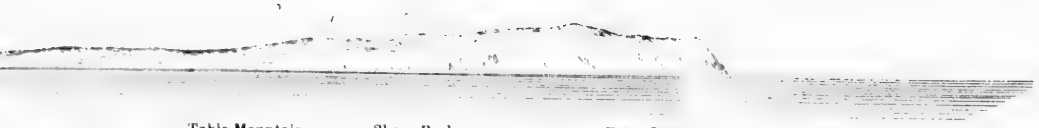


Table Mountain, 2,244 feet.

Sharp Peak, 2,561 feet.

Point Loma Light-House, SE. by S.

Point San Mateo.

San Onofre Mountain, E. by S. ¼ S., 17 miles, 1,725 feet.

the Point, when it bears northeast by east (NE. by E.) distant one and a half miles; then keep close along the edge of the kelp on the starboard hand in four and a half fathoms and about half a mile from the Point. The three fathom curve stretches one-third of a mile south of the Point and leaves a narrow lane of deeper water between it and the kelp. After entering this opening in the kelp steer for the bell buoy outside the bar, lying in eight and a half fathoms of water over sandy bottom southeast one third south (SE. ⅓ S.), three-quarters of a mile from the extremity of Point Loma and close to the inner edge of the kelp.

Some steamers pass through the kelp north of this partial opening and thereby run some risk, because a break, already described, is reported just inside the kelp and bearing about west three-quarters south (W. ¾ S.) one and one-quarter miles from the Light.

As soon as the extremity of Point Loma is passed, and when nearly up to the bell buoy outside the bar, the long, low beach of shingle forming Ballast Point is opened.

From the bell buoy two others in line lie, respectively, on the outer and inner edges of the bar. The *outer mid-channel buoy* lies in four and one-third fathoms north by east one-eighth east (N. by E. ⅛ E.) five-eighths mile distant from the bell buoy, and the *inner mid-channel buoy* lies in six fathoms on the same bearing, three-eighths of a mile further in. Between these last two buoys lies the bar, and to carry the best water (twenty feet at low water) over it leave the buoys about one hundred yards on the port hand. After passing the inner mid-channel buoy about two hundred yards steer northwest by north three-quarters north (NW. by N. ¾ N.) to go through the entrance in the deepest water, and a little closer to Ballast Point than to Zuniga Point, opposite. The channel between the three-fathom lines on either side is less than one-third of a mile broad and has a depth of about six fathoms in it. With the least swell on, the breakers show the position and extent of the Zuniga Shoal. Steer boldly for the entrance, where the depth is ten fathoms close to Ballast Point and four fathoms close to Zuniga Point.

If a vessel enters from the westward around the southern tail of the kelp-field stretching off Point Loma she should haul close under the eastern edge of the kelp on a north half east (N. ½ E.) course until the bell buoy is reached, and proceed as above directed.

If a vessel enter from the southward she should work short tacks under the southern shore until she gets to the leeward edge of the kelp field and as near as practicable to Point Loma, keeping clear of the Zuniga Shoal. A steamer may head directly for Point Loma until up with the bar buoys.

From the bell buoy a vessel may pass on either side of the outer and inner mid-channel buoys on a north by east one-eighth east course, but in vessels of deep draught seek the best water by leaving these buoys about one hundred yards on the port hand, as above directed.

In sailing vessels, during summer winds, keep as close to Point Loma as the draught of the vessel will permit and keep close on the wind up to Ballast Point, off which four fathoms can be carried within a ship's length, with a very strong current on the ebb and flood tides, the former setting over the Zuniga Shoal.

It has been said that a rock having but five or six feet of water upon it lies in the channel between the bar and Ballast Point, its position marked by a patch of kelp, which is torn away in rough weather. The pilot-boat *Fanny* reported having struck upon it in 1851. The examinations of the Coast Survey have developed no such danger, and as neither navigators nor recent pilots have found this rock the report has been discredited.

The Hotel del Coronado, on the ocean beach, is a fine landmark, especially for small coasting vessels coming from the southward and keeping near the shore.

The length of the frontage on the ocean is four hundred and fifty feet. The height of the main building fronting the sea is fifty feet; the height of the tower at the southeast angle is one hundred and twenty feet, and there is an electric light at the top.

From the tower the following bearings and distances are given to prominent objects:

The whistling buoy	S. 30½	W.	4¼ miles.
The bell buoy (the line passing over the tail of the Zuniga Shoal)	S. 47	W.	3⅜ miles.
The southernmost point of the Loma	S. 60	W.	3¼ miles.
The light-house on Point Loma	S. 67	W.	3¼ miles.
The largest Coronado islet	S.	¾ E.	17 miles.

The geographical position of the electric light on the southeast tower of the hotel, as given by the U. S. Coast and Geodetic Survey, is:

Latitude	32°	40′	43″.7	north.
Longitude	117°	10′	52″.5	west.
Or, in time	7h	48m	43s.5	

Inside Sailing Directions.—After passing Ballast Point close on the port hand, steer a course northwest by north half north (NW. by N. ½ N.) for three-quarters of a mile to La Playa, keeping the black buoy marking Ballast Point Shoal, and three-eighths of a mile inside the point, on your port hand. This buoy will be about one eighth of a mile inside your course.

If intending to anchor off La Playa, continue your course until the two *red beacons* on the edge of the eastern flats are in range, and anchor in eight to ten fathoms of water over sticky bottom.

But if bound up the bay, change your course when the first two red beacons (Nos. 2 and 4) are in range to north by east seven-eighths east (N. by E. ⅞ E.), which leads midway between red Beacon No. 2 and black Beacon No. 3; run past them until the second two red beacons (Nos. 4 and 6) are in range, when you will be abreast of black Beacon No. 3.

Hence the flats on either side of the channel are very extensive, with occasional patches bare at low water.

From abreast of black Beacon No. 3 steer northeast by north (NE. by N.) direct for black Beacon No. 5, on the port side of the channel, for a little over three-quarters of a mile, or until red Beacon No. 6 and black Beacon No. 7 come into range. This course will pass red Beacon No. 4 within one-eighth of a mile.

Now change your course and steer northeast three quarters east (NE. ¾ E.) for half a mile (passing midway between black Beacon No. 5 and red Beacon No. 6) until red Beacon No. 6 is in back range with Point Loma Light house.

Then steer east half north (E. ½ N.) for the black Beacon No. 7 for three-quarters of a mile in six fathoms of water, a little to the southward of mid channel, when the new red beacon close under the fast land of the south shore will be seen. Keep your course until this new red beacon is in range with Point Loma Light house bearing southwest by south half south (SW. by S. ½ S.).

Then change to east by south half south (E. by S. ½ S.) for one and three-quarters miles to the wharves at San Diego.

Or, if bound up to National City wharf, instead of the last course steer east southeast (ESE.) for four miles to the end of the wharf at National City.

Beyond red Beacon No. 8, which is abreast of and a little beyond the San Diego wharves, the channel contracts, but the last course will give good water to the wharf, and the channel is well marked by beacons.

The depth of water at the San Diego wharves is from eighteen to twenty-six feet, and at the National City wharf nearly the same. The wharves at San Diego extend about six hundred and fifty yards from the shore, with cross-head, alongside of which vessels can readily run. The National City wharf is eight hundred yards long.

Channel west of Ballast Point Shoal.—This has already been mentioned under Ballast Point Shoal. It has been recommended that vessels of eighteen feet draught and upwards should not pass to the eastward of the Ballast Point Shoal on the direct course from the entrance at Ballast Point to La Playa, but pass to the westward of it and under the high main shore. The depth of water is greater in this channel than on the direct course; but the channel has a very sharp turn and is barely over one-eighth of a mile wide. It is not available for large sailing vessels with the summer winds; and for large steamers it necessitates two very sharp changes in their course where the currents run strongly and irregularly.

If this channel is taken, then a vessel, when abreast of Ballast Point, must change her course to west by north (W. by N.), so as to pass close around it on the port hand in ten or eleven fathoms of water. Ballast Point must be hugged closely, because the tail of the shoal is laid down within less than one-eighth of a mile to the northwest by north (NW. by N.) of it. Run on that course about one fifth of a mile until the black Buoy No. 1, marking the shoalest water, is a little abaft the starboard beam or bearing northeast three quarters north (NE. ¾ N.); then change the course to north by west half west (N. by W. ½ W.), running through the narrow but deep channel between the shoal and the shore with nine fathoms of water. After passing the black buoy haul gradually to a north course until the first two red beacons (Nos. 2 and 4) are in line; then continue between the red and black beacons as heretofore directed.

Quarantine Station, San Diego Bay.—Commissioners appointed by the United States have reported in favor of locating the Government quarantine station on the shore just northward of the point at La Playa.

For the regulations of these Government stations, see notice under San Francisco.

TIDES AT SAN DIEGO.

General remarks upon the nature of the tides will be given when discussing the tides at San Francisco.

The Corrected Establishment or mean interval between the time of the moon's transit and the time of high water at La Playa is $1^{h}\ 38^{m}$. The mean rise and fall of tides is three and seven-tenths feet, of spring tides five feet, and of neap tides two and three-tenths feet; the mean duration of the flood is $6^{h}\ 25^{m}$; of the ebb $6^{h}\ 0^{m}$; and of the stand $0^{h}\ 30^{m}$. The average difference between the Corrected Establishment of the a. m. and p. m. tides of the same day is $1^{h}\ 20^{m}$ for high water, and $1^{h}\ 6^{m}$ for low water. The differences, when the moon's declination is greatest, are $2^{h}\ 4^{m}$ and $1^{h}\ 36^{m}$, respectively. The average difference in the height of these two tides is one and a half feet for the high waters and two and one-tenth feet for the low waters. When the moon's declination is greatest, those differences are two and two-tenths feet and three feet, respectively. The average difference of the higher high and lower low waters of the same day is five and a half feet, and when the moon's declination is greatest, six and three-tenths feet. The higher high tide in the twenty-four hours occurs about $9^{h}\ 0^{m}$ after the moon's upper transit (southing), when the moon's declination is north, and about $3^{h}\ 16^{m}$ before when south. The lower of the low waters occurs about seven and a quarter hours after the higher high tide.

The greatest observed difference between two low waters of one day was four and two-tenths feet, and the greatest difference between the higher high and lower low waters of one day, eight and eight tenths feet.

The two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

Moon's declination	Moon's upper meridian passage				Moon's lower meridian passage			
	High water		Low water		High water		Low water	
	Interval	Height	Interval	Height	Interval	Height	Interval	Height
	H. M.	Ft.	H. M.	Ft.	H. M.	Ft.	H. M.	Ft.
Greatest north	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Zero	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Greatest south	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The interval is to be added to the time of the moon's meridian passage to give the time of high or low water. The time of the moon's upper meridian passage is given in the almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters; to which level the soundings on the chart are given.

Spring Tides.—At the full and change of the moon the high waters will be seven-tenths of a foot higher than the above, and the low water seven tenths of a foot lower.

Neap Tides.—At the moon's first and last quarters the high waters will be seven-tenths of a foot lower than given in the above table, and the low water will not fall as low by seven-tenths of a foot.

The march of the tide from the bar to the wharf at San Diego averages fifteen minutes, but is subject to great irregularities, probably on account of wind and swell.

Latitude and Longitude of stations in San Diego Bay.—The primary astronomical station of the Coast and Geodetic Survey is on the round-topped hill, one hundred and ninety-four feet high and a quarter of a mile west southwest of La Playa.

Its geographical position is:

Latitude	32	41	[illegible]	north.
Longitude	117	14	[illegible]	west.
Or, in time	7h	48m	[illegible]	

The magnetic variation was 13° 58′ east in 1885, with an annual increase of 1′.5.

This station is also a bench-mark for the long series of tides observed here.

The telegraphic astronomical station of the Coast and Geodetic Survey in San Diego* is on the

* In 1769 the latitude of "San Diego at the camp occupied by the overland expedition" was determined by Don Michael Constanzo, the engineer of Gov. Gaspar Portala's expedition, as 32° 41′ north.

brow of the plateau above the town, and one hundred and fifty feet above the bay, at the corner of Ash and Seventh streets, and marked by a brick pier. Its geographical position is:

Latitude	32°	43′	06″	North
Longitude	117°	09′	30″	West
Or, in time	7h	48m	38s.0	

The magnetic declination observed at this station in May, 1871, was 14° 16′.7 east, with an annual increase of 2′.37, but there was evidently local attraction.

This station has been used as the starting point for all the longitudes along the coast of Lower California.

The country around San Diego Bay for many miles is a great table land about three hundred and fifty feet above the sea, and cut up in many places by deep and sharp arroyos. This table land is too parched for cultivation, and, in most places, too elevated for irrigation. In the river bottom and along the valleys of the smaller streams the soil is rich and genial.

The great drawback about San Diego Bay is the scarcity of fresh water, which is obtained from wells, the river, and small streams. In 1851 an effort was made to obtain a supply at La Playa by sinking an artesian well, but after boring six hundred and thirty five feet the attempt was abandoned. About the same time a similar attempt was made at San Diego, and another in 1872; now it is proposed to bring the water from the higher parts of the San Diego River.

The average rain fall at San Diego for thirty-one years was nine and a half inches; and during the long dry season the river loses itself in the sand, and the inhabitants at the old town and along the river-bottom are then compelled to dig in its bed to obtain their supply of water. To the winter of 1873 there had been no water in the river for a period of five years, consequent upon the previous dry winters. The following table exhibits the mean monthly rain-fall at San Diego for thirty-one years, up to 1881:

	Inches		Inches
Summer:		Winter:	
June	0.07	December	2.20
July	0.02	January	1.38
August	0.00	February	1.97
	0.09		5.55
Autumn:		Spring:	
September	0.06	March	1.02
October	0.57	April	0.52
November	1.11	May	0.34
	1.74		2.08

Average annual rain fall equals 9.5 inches.

The town of San Diego* has increased in size, wealth, and population, and a new town, named "National City," has been built up three miles southward, while the old town remains much the same as in previous years. The population bordering upon the bay, according to the census of 1880, was nearly 3,000, but with the railroad connection now made at Colton with the great scheme of the Southern Pacific the country is very rapidly filling up.

Communication with San Francisco and the northern or windward ports is maintained by steamers every five days, and by regular lines of sailing vessels. When fishing assumes a more practical shape the harbor of San Diego will be an important port therefor. Already several small companies are engaged in the whaling business. The waters in this vicinity abound with the "California Greys," which are very troublesome to deal with unless the bomb lance is used in killing them.

San Diego Bay was discovered by Juan Rodriguez Cabrillo, a Portuguese in the service of Spain, in September, 1542; called El Puerto de San Miguel, and placed by him in latitude 34° 20′ north, showing the imperfection of the instruments and the modes of observing in those days. He found great numbers of Indians here, who received him hospitably, but with caution. It received its present name from Sebastian Vizcaino, who surveyed it in November, 1602. On his chart he has called it "Puerto bueno de S. Diego."

It is usually said that there was a great forest of oaks and other trees on the northwest side of the bay. This is a mistake, and it has evidently arisen from a mistranslation of the word "monte." The monte of Vizcaino is the elevated ridge of Point Loma, which protects the port from the northwest winds, and on which his officers found a great deal of wood of evergreen oak

*Formerly known as New Town, then New San Diego, and then South San Diego.

and other trees, and shrubs. From the summit of "El Monte" they had a view of this great bay, which protected from all winds. And this ridge, of three leagues long and half a league wide, bounds the bay to the northwest, and on the other side, towards the northwest, there is another good port.* This latter is False Bay.

La Pérouse (in 1787) gives a copy of an English map of San Diego, of 1782, on which no name is assigned to the Zuniga Shoal, but the shoal inside Ballast Point and under the eastern shore is called "Shoal of Zuniga." Ballast Point is called "Point Guisarros," and Point Loma "Hill Point."

Dalrymple, in January, 1789, published a copy of a Spanish chart of San Diego, of 1782. No name is attached to it, but it is marked "taken from Spanish manuscripts."

The existence of a bar at the entrance of this port was discovered by Vancouver in 1793, and in criticising the plan of the harbor published by Dalrymple in 1782 he remarks:

This plan, in point of correctness, is justly entitled to much praise, but was yet capable, as far as came under my observation, of the following little improvements: The scale representing five nautical miles should only subtend three miles and a half; the shoals of Barros de Zooniga, though well placed, instead of being two distinct shoals ought to have been one entire shoal, stretching something further to the northwest and southeast than is therein represented; and the soundings between Barros de Zooniga and the land of Punta de la Loma (which is omitted) are, in no part, from the south extremity of the former directly across to the latter, more than four fathoms at high water, and form a narrow bar from the shore to the shoal, gradually deepening as well on the inside as on the outside of the bar, with a regular increase in mid-channel from five, close to the shore, to ten fathoms between the two low points that form the entrance to the port. (Vol. II, p. 473.)

On Ballast Point, at the base of the Point Loma ridge, we found, in 1851, the ruins of the old Spanish fortifications.

Vancouver has a view of Point Loma and the entrance to San Diego in his volume of charts. The latest chart of San Diego Bay is that of 1886, by the Coast and Geodetic Survey.

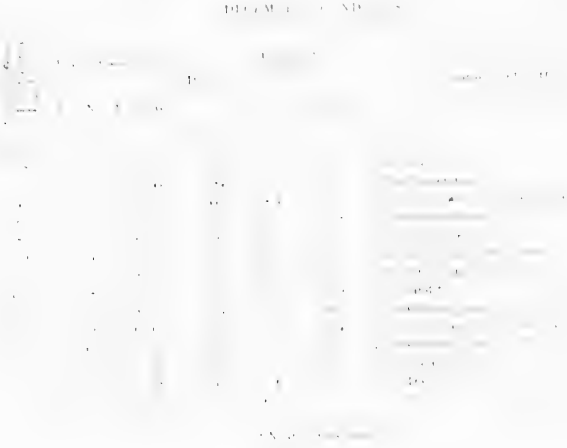
Magnetic Declination.—For 1885 the line of equal magnetic declination of fourteen degrees east cuts the coast line in latitude 32° 32′ near the head of San Diego Bay, and moves annually one and one half minutes to the northward. The general direction of this line is west southwest (WSW.) and east-northeast (ENE.).

Deep Sea Soundings off San Diego.—The U. S. steamer *Tuscarora*, in 1873 and 1874, ran two lines of deep sea soundings from San Diego, one being towards and beyond the Cortes Bank around its southern edge, and the other directly to the southwest. As these are matters of interest the results are tabulated as follows:

JANUARY 6 AND 7, 1874.

Position of sounding.				Depth.	Temperature Fahr.		Character of bottom
Lat. N.		Long. W.			Surface.	Bottom.	
[illegible]		[illegible]		[illegible]	[illegible]		
[illegible]		[illegible]		71	58.2	.....	Gray and black sand and broken shells
[illegible]		[illegible]		[illegible]	58.2	.....	Dark mud, with fine sand
[illegible]		[illegible]	24	622	57.8	58.4	Do
				571	58.0	58.8	Dark mud
				687	59.8	58.0	Do
			47	1,053	58.8	56.4	Greenish mud
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		Rock, and between this and next sounding 2 8 fathoms, rocky bed
		[illegible]	[illegible]	[illegible]	[illegible]	57.6	Gray mud, fine black specks
[illegible]	[illegible]	[illegible]	41	596	59.4	58.6	Do
[illegible]	[illegible]	[illegible]	[illegible]	980	59.8	56.2	Whitish gray mud.
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	54.0	Yellowish brown mud.
[illegible]				[illegible]	[illegible]	[illegible]	Brown mud
[illegible]		[illegible]	46	2,178	61.0	55.9	Do
		[illegible]	[illegible]	2,240	60.0	54.6	Yellowish brown mud
	[illegible]	[illegible]	28	2,250	60.4	53.9	Yellowish brown mud and ooze
	[illegible]	[illegible]	[illegible]	2,214	61.0	53.9	Do

*El dia Siguente despues del Glorioso San Martin, por la Mañana, mando el General fuera alguna gente a reconocer un Monte, que resguarda a este Puerto de Viento Norueste, y fue el Alferez Alarcon, y el Capitan Peguete, y el Padre Fra Antonio de la Ascension, con ocho Arcabuceros; hallaron en el mucha leña de Encina, y otros Arboles, como hueron Naras, y otros, que se parecian a el Romero, y otras yerbas muy odoriferas, y saludables. El Monte, que es el reparo de este Puerto para el Norueste, tendra tres leguas de largo, y media de Ancho, y de la otra parte del Norueste de este Monte hay otro buen Puerto.



FALSE BAY

The northern edge of the ridge of Point Loma, bordering on the sea, gradually decreases in height to a low sandy point which borders the fast land. Abreast of this point, a little over a quarter of a mile to the north, is the southern termination of a long, low, narrow line of sand dunes running two miles to the north by west to fast land.

Behind this low sandy peninsula, which is only from one hundred to two hundred yards wide, lies an extensive shoal bay, called Puerto Falso, or False Bay. It stretches inland about two and a half miles to the foot of the high land, and more than three quarters of its area is marsh and flats, bare at low water. There is a very narrow channel through the bay, with three to seventeen feet of water in it, and a basin three quarters of a mile in extent with from one to ten feet. The entrance is between the northernmost part of the Point Loma ridge and the sandy peninsula stretching from the north, with a broad bar more than a quarter of a mile outside having only three feet of water upon it, and the whole outline marked with heavy breakers when any swell is on. It can be crossed only at high water in the smoothest weather. The entrance inside the line of breakers is about a quarter of a mile in width, with thirteen feet of water in the deepest part; but the width contracts to one eighth of a mile at the inner extremity of the sand point, with a depth of nineteen feet scoured out.

The north point of the entrance to False Bay is formed by low narrow sand dunes, and is named *Point Medanos*, but on this coast it is generally written Meganos.

The bay has no importance whatever. It now receives the waters of the San Diego River, which tends to shoal it still more. It was first recognized by Vizcaino in 1602.

False Point, or *La Jolla*.—Immediately northwestward of False Bay for six or seven miles the shore makes a rounding point two or three miles outside the general shore line. This presents a rocky coast line, where the sandstone cliffs are much water worn and hollowed out. This projection is known as False Point on the Coast Survey charts, but as La Jolla by the Spaniards, from the name of the rancho in the small valley on the north side of it. It is ten miles northwest by north half north (NW. by N. $\frac{1}{2}$ N.) from Point Loma.

THE COAST LINE TO POINT FERMIN.

Pine Hill.—One mile south of the town of Del Mar and six miles northward from Point La Jolla there is a hillock of three hundred and forty six feet elevation sparsely covered with pines. The face of the hillock is an irregular cliff forming the shore. As this is the only pine-covered hillock for many miles along this coast line it is an important landmark to vessels that are running close along shore in foggy weather.

To the north and west of False Bay and False Point the shore is a compact line of cliffs, unbroken except where streams such as the Pinasquitos, San Dieguito, San Bernardo, San Luis Rey, and Santa Margarita break through the deep, sharp valleys called cañadas. The bluff is

bordered by a narrow sand beach; behind the bluff the country is table-land, ranging from forty to three hundred and fifty feet above the sea for some distance inland.

The Landfalls in this stretch of coast are the high peaks of the mountain ranges lying twenty to twenty five miles inside the coast line. The first range is that of *Santa Maria*, twenty-five miles northeast from Point Loma, and in fact this point is the narrow ocean spur of the range under whose southeast flank flows the San Diego River. The highest peak in the Santa Maria Mountains lies twenty six and a half miles north thirty three degrees east (N. 33° E.) from Point Loma Light; it is three thousand and fifty feet above the sea, and should be visible thirty-five miles at sea, beyond Point Loma. Its approximate geographical position is latitude 32° 55′, longitude 116° 53′.

Broad inland from San Luis Rey is the broken crest line of the *San Luis Rey Mountains*, seventeen or eighteen miles from the coast. In this range are two peaks which are notable. Pala Mountain, thirty-eight hundred feet in elevation and lying twenty four miles north forty-seven degrees east (N. 47° E.) from the mouth of the San Luis Rey Cañada, is approximately in latitude 33° 22′ north and longitude 117° 02′ west; and Mount Palamar, in approximate latitude, 33° 27′ and longitude 116° 58′, reaches forty five hundred feet, and lies twenty six and a half miles north fifty-two degrees east (N. 52° E.) from the San Luis Rey Cañada. It should be visible nearly fifty miles at sea beyond the shore at Ocean Side.

Twenty to twenty five miles behind San Juan Capistrano is the compact *Sierra de Santa Ana*, rising two thousand to three thousand feet and culminating in the great double-headed Peak Santiago, five thousand six hundred and eighty-two feet in elevation. It lies north sixteen degrees east (N. 16° E.) twenty-one miles from Point San Juan Capistrano, and should be visible sixty miles at sea outside of that point. It has been seen from a vessel's deck when twelve miles to the westward of Point Dume over the low land which connects San Pedro Hill with the main. It rears its dark mass far above the lighter colored slopes in the foreground, and is such a notable landfall for all this region that it seems astonishing neither the old Spanish navigators nor Vancouver ever referred to it.

Far inland behind these broken lines of coast mountains is the wild mass of the *San Jacinto Mountains*, whose peaks reach probably seven thousand feet and lie forty to forty-five miles inland. They are visible at forty miles from the shore.

Well to the northeastward, and inside of all these mountains, lies the great *San Bernardino Range*, at a distance of sixty or seventy miles from the shore, and with peaks rising to eleven thousand and twelve thousand feet; but these cannot be seen over the coast ranges until abreast of San Pedro Bay and beyond it off Santa Monica Bay.

From Point Loma to Point San Juan Capistrano the course is north forty degrees west (N. 40° W.) and the distance fifty three miles, the shore retreating regularly seven or eight miles to the eastward at about midway between them. The waters off this stretch of coast were called the "Bay of Santa Catalina" by Vizcaino in 1602. Towards San Juan Capistrano the high hills approach the immediate shore, almost obliterating the table-land, and the old stage road made a detour eastward behind the hills to the northwest of the anchorage of San Juan Capistrano. Upon the cliff between Penasquitos Creek and Point San Mateo (twenty-seven miles) the road runs for a long distance over a table land of remarkable evenness and moderate elevation. In places this table is marked by innumerable gravelly hillocks of about twenty or thirty feet in diameter and two feet elevation above the depressions between them. The mountains and the table lands are covered with grass and chaparral, but destitute of trees.

Along the line of coast just mentioned there is being constructed a line of railroad in part under the cliffs. The first railroad opened upon the coast at the mouth of the San Luis Rey River and followed it to within five miles of La Jolla.

From Point Capistrano the course to Point Lasuen is north sixty-five degrees west (N. 65° W.) and the distance twenty miles, with a tolerably straight shore line and a narrow table land in front of the hills, which rise from six hundred to eleven hundred feet in elevation for more than half the distance.

From Point Lasuen to Point Fermin the course is south eighty-six degrees west (S. 86° W.) and the distance fourteen miles; the shore is very low and retreats five miles to the northward, forming the crescent-shaped Bay of San Pedro. The course from Point Loma to Point Fermin is north fifty-five degrees west (N. 55° W.), distance eighty miles, the shore forming a gradual curve about fifteen miles eastward therefrom.

SAN LUIS REY.

From Point Loma to the opening of the valley of San Luis Rey upon the coast the course is north twenty-six degrees west (N. 26° W.) and the distance thirty-two miles. The table lands are cut through by the Soledad or Penasquitos Creek, the San Dieguito River, the San Dieguito Creek, San Marcos Creek, and the San Luis Rey River. The shore-line is a very regular one, with a slight curvature to the eastward, and no reported dangers. It is not often approached by the regular steamers and trading vessels, because it is far to the eastward of their course to and from San Diego. There is a broad low-water sand-beach, but at high water the sea washes the base of the cliffs.*

The California Southern Railroad now runs along the top of the cliffs for fifteen and a half miles from Codero, near the mouth of Soledad Creek, to near the mouth of the San Luis Rey Cañada, where it leaves the coast to enter and follow the Santa Margarita River through the Temecula Cañon. The railroad station, Oceanside, near San Luis Rey Cañada, is now quite a settlement, and at various points along the line of the road are seen houses which become land marks to the navigator; but they are being added to so rapidly that it is not yet proper to specify details.

The anchorage of San Luis Rey is open and unprotected, and is rarely visited. The approximate geographical position of the new town of Oceanside is:

Latitude	33° 12′	north
Longitude	117 23	west.

In January, 1885, the magnetic variation was 14° 17′ east, with a yearly increase of 1′.5.

The height of the town above the sea is eighty to one hundred and twenty feet.

The mesa land on each side of the cañada is estimated to be two hundred feet above the sea and treeless, and the mark for making the anchorage is the white buildings of the new town.

The new wharf at Oceanside extends square out from the face of the low bluff half a mile south of the town and half a mile north of the valley through which the Escondido Railroad comes to the coast. It is now three hundred and sixty six yards long and reaches to eighteen feet of water at low tide. It is proposed to extend it one hundred and twenty-five yards further. The latitude of the wharf is just under 33° 11′.

Behind the high plateau the treeless, rolling land extends probably fifteen miles to the foot of the high mountains. In a wet winter and spring the land is beautifully green and covered with flowers; in a dry season it looks very brown and barren. The shore-line is remarkably regular and bordered by a broad low-water beach.

The Mission of San Luis Rey, situated three miles from the coast line, was the largest in California, and the number of domesticated Indians formerly in its neighborhood gave it the appearance of a thriving settlement. It is very prettily situated upon a hillock in the valley near the present town, but is rapidly falling into decay. The town is nearly in the center of a section of country unequaled for salubrity and productiveness, but the small rain-fall is a great drawback to agriculture. For two years the average rain fall was only thirteen and a half inches. According to the census of 1880 the population was 300, but the new town is increasing with great promise.

Communication with the coast towns is now had by the railroad which connects San Diego with Colton, on the main line of the Southern Pacific. Just one mile north of the mouth of the San Luis Rey River is the mouth of the Santa Margarita River, which comes twenty one miles from the northeast through the Temecula Cañon, which it has reached by a southeast course, parallel with the coast, behind the mountains. The valley of this river is the line of the railroad to within a mile of the coast.

Seven or eight miles northwestward from San Luis Rey is the very small stream called Las Flores Creek, marked by a breaking down of the cliffs from about sixty feet to high water level for about half a mile. To the southeast and northwest for half a mile are several sharp barrancas, sixty to seventy feet deep. The ranch-houses lie about half a mile back from the shore, at the northwest side of the small valley. The hills rise to six hundred and fifty feet in one and a quarter miles from the shore, and to seven hundred and thirty-six feet in two and a half miles. The whole coast-line is very regular, with a broad low-water sand beach.

Las Flores Creek is known as the Las Pulgas a few miles back from the coast.

* Vizcaino called this long stretch of coast from False Bay to San Juan Capistrano, Costa Segura.

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Santiago, cloud-capped

San Onofre Mt
Point San Juan Capistrano, L. by S. 4 S. 14 miles
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Niguel Hill.
Point San Juan Capistrano, E. by S., 25 miles.

San Onofre Mountain, E. by S., 35 miles, very faint, 1,725 feet.

Onofre Mt
Capistrano, E. by S. ½ S., 14 miles

Mountain very faint

Nine miles from San Luis Rey, and beyond the Flores Creek, the low cliffs change to higher ones and the high hills come closer upon the shore-line, so that the stage road is crowded under the base of the sharp sloping hills. At one and a half miles northwest from Flores Creek the cliff is one hundred and twenty feet high and is continuous to the Horno Cañon, which breaks through to the ocean at two and a half miles from Flores Creek and six and a quarter miles from Point San Mateo. The sides of this cañon near the shore-line are one hundred feet high; one mile back it is deep between mountains one thousand to fifteen hundred feet elevation. Just to the northwest of the mouth of the cañon the cliffs are one hundred and twenty to one hundred and forty feet high and precipitous. The shore-line is regular, with a low water sand beach of varying width and here and there marked by rocky patches.

At a quarter of a mile back the treeless hills rise rapidly to a marked crest-line, reaching seventeen hundred and twenty feet elevation at one and three-quarters miles from the shore. This crest-line falls slightly towards the San Juan Capistrano and gradually approaches the shore. It is in part broken through at three and a quarter miles by the San Onofre Valley. Behind this ridge there is a sharp descent and the northeast side of the crest-line is covered with chaparral. The highest point of this notable ridge is in latitude 33° 21′ 45″ north, longitude 117° 28′ 45″ west. Inland from it the mountains rise to the main crest-line about twenty miles from the coast.

San Onofre Mountain (land-fall).—Triangulation station "Ridge," on the summit of San Onofre Mountain is in latitude 33° 22′ 20″.08, longitude 117° 30′ 46″.01; height seventeen hundred and twenty-five feet.

Triangulation station "San Onofre Hill" is in latitude 33° 22′ 28″.38, longitude 117° 32′ 24″.78; height eleven hundred and eleven feet.

The last is a prominent summit for tertiary triangulation, but comparatively insignificant as seen from seaward. The length of main ridge is parallel with the coast.

Point San Mateo.—Along the stretch of coast from La Jolla, or False Point, to Point San Mateo no projection or sharp indentation breaks the regularity of the coast-line. This point lies north thirty-seven degrees west (N. 37° W.), forty-five and a half miles from Point Loma Light-house, and east-southeast (ESE.) seven and a half miles from Point San Juan Capistrano. A little more than one mile before reaching the point the narrow, steep valley of the San Onofre comes in from the northeast by east, breaking down the high ridge from the Horno Cañon. At the beach the cliffs drop to twenty feet, with a broad high-water sand beach. The cliffs on each side of this half-mile long beach are sixty feet high; then to the southeast are broken with short, deep barancas. The table land stretches a mile into the valley, which is marked by a heavy line of sycamore trees. The bed of the stream, which is dry in summer, lies under the sharp cliffs of the seaward end of the Cuchillo Medio. This sharp ridge is a quarter of a mile wide at the shore, with cliffs sixty feet high, and behind it the land rises rapidly towards the northeast to seven hundred and twenty feet elevation in one and one quarter miles.

Foster's Landing.—Abreast the San Onofre Valley is the [illegible] roadstead of Foster's Landing, used by vessels carrying away the products of the country. It is a [illegible] landing and directly op[illegible] to the southward.

Point San Mateo is sixty feet high, and has an adobe building upon it three hundred yards back from the water; and a small hillock, four hundred feet high, rises from the table-land nearly a mile to the northward, with a depression of one hundred and forty feet behind it, which again rises to a higher hill of seven hundred feet elevation at two miles from the Point. The San Mateo Valley lies between the Cuchillo Medio and the ridge of Point San Mateo. It [illegible] a mile wide and has a small stream of water which opens close under the Point. There are a few clumps of sycamore trees visible in the valley.

The geographical position of Point San Mateo has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	33	23	15 .9	north.
Longitude	117	35	51 .0	west.
Or, in time	7h	50m	23s.4	

From Point San Mateo northwestward the coast-line runs in a long, regular sweep, curving one and a half miles to the northward, with mesa-lands bordering the sea, and higher land behind reaching six hundred to eight hundred and forty feet within a mile and a third from the shore. This table land is from one hundred to one hundred and forty feet at the edge of the cliffs, with a smooth, regular, high-water sand beach at its base, running to San Juan Capistrano. The

mouths of the deep, narrow arroyos cutting through the bluff are crossed by small bridges. The whole country along the coast is treeless.* The high lands rise gradually to the first crest of two thousand and three thousand feet at the Santa Ana range of mountains, twenty to twenty-five miles in the interior.

A moderately solid *field of kelp* lies off the shore hence to the anchorage of San Juan Capistrano. Exactly one and one-half miles west-northwest (WNW.) from Point San Mateo, and lying almost half a mile off the beach, is a rocky patch one hundred yards in extent locally known as the *San Mateo Seal Rocks.* The rocks are about four feet above high water and usually covered with sea-lions. Two and three-quarter miles to the west northwest (WNW.) from Point San Mateo, and less than half a mile off the beach, is another rocky patch about one hundred and fifty yards in extent.

From Point San Mateo the extremity of Point San Juan Capistrano lies north sixty-eight degrees west (N. 68° W.), distant seven and a half miles, and from the same point the anchorage of San Juan Capistrano bears north sixty degrees west (N. 60° W.), distant six miles.

POINT SAN JUAN CAPISTRANO AND ANCHORAGE.

This well defined cape, locally known as Dana Point, is the southwestern projection of a long high, transverse ridge coming from the southwestern flank of the Sierra Santa Ana, which lie from twenty to twenty-five miles broad in from the coast and parallel therewith, and which is a good landfall. That range of mountains is from two thousand to three thousand feet in eleva tion, and there are several transverse spurs like that of San Juan Capistrano.

The spur forming the cape ends is a moderately bold sands'one cliff two hundred and twenty feet high, with a precipitous broken face, and some low rocks which stretch out as far as three hundred and forty yards to the southward of the highest part of the cliff. The outer extremity of the head lies north sixty-eight degrees west (N. 68° W.) seven and a half miles from Point San Mateo, and south seventy-seven degrees east (S. 77° E.) thirty one miles from Point Fermin Light.

Seven hundred yards within the extremity of the cape there is a slightly double head, the inner and higher being two hundred and eighty feet above the water, and the outer one, overlooking the cliffs, is two hundred and sixty feet. The hills to the north by east, stretching three miles behind the cape, reach six hundred feet elevation and are destitute of timber. But the higher parts of the head are at Niguel station, three and a quarter miles northwest by north (NW. by N.) from the Point, and less than a mile from the shore, where the elevation is nine hundred and forty feet. Very sharp arroyos cut through all this hilly headland.

When Point San Juan Capistrano is seen broad on from the south by east (S. by E.) it presents a bare vertical whitish face with a broad dark band stretching from the upper and western part down to the lower and eastern part at the low white rock, and continuing around inside the white rock. The cliff to the eastward as far as the Capistrano Valley is bare and bright with dark streaks rising at a small angle from the west downward to the right. The point is projected on the low hills inside of San Niguel Hill, and the high land beyond stretches well to the west. When the point is seen from the southeast by east (SE. by E.) it shows clear of all the distant high land, and San Niguel Hill is seen just inside and over it. The dark band is plainly made out at five or six miles, and the small black San Juan rock is seen just outside of it.

The southeastern face of the cape is an irregular line of cliffs from two hundred feet at the western end to one hundred and twenty feet at the eastern end. It is one and a quarter miles long east and west, with a very slight indentation under the cape. From the extremity of the cape the shore runs northwest by north (NW. by N.) one and a half miles, high and with a broken, sandy beach thence for ten or twelve miles to the northwest by west (NW. by W.). It is high, cut by deep arroyos, and bordered by sand beach, with irregular outlying patches of kelp.

Immediately off the cape for three hundred yards stretch out rocky patches; and the San Juan Rock, about fifty yards in extent and six feet above water, lies three hundred and forty yards to the southward of the highest point of the cliff. The cliff at the eastern side of the cape is two hundred and twenty feet high, rising very precipitously, and bordered by a narrow shingle beach, and this by outlying rocks. The bluff continues high to the curving shore eastward, where it meets a low and sandy beach at the opening of the San Juan Capistrano Valley. Through this beach

*Vizcaino has a point named Arboleda somewhere, Point San Juan Capistrano, probably named from his seeing trees in the Capistrano Valley.

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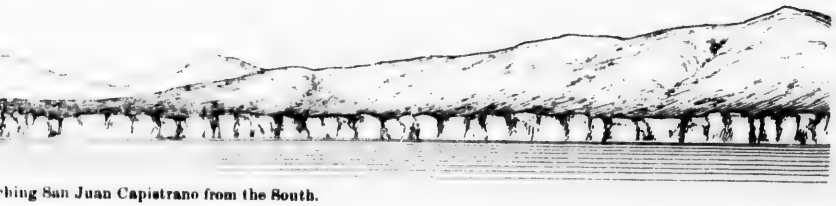
Approaching San Juan Capistrano from

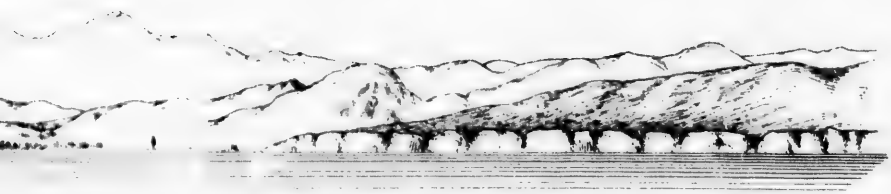
San Juan Rock. White Rock; old Embarcadero.
Point Juan Capistrano, NW by W. ¼ W., 4 miles.

San Juan Capistrano Valley.
Range tree, NE. b



hing San Juan Capistrano from the South.

San Juan Capistrano, Valley, and Range tree.



n Juan Capistrano Valley.

Range tree, NE. by N. ¼ N., 2¼ miles.

San Juan Creek breaks its way in wet seasons, but is closed in dry seasons. The opening is generally at the western side and close under the cliff, which is one hundred and twenty feet high.

The contracted and unprotected *anchorage* is in the bight one and a half miles to the eastward of Point San Juan Capistrano. There has been no hydrographic survey of the anchorage, but it is known that it has a reef stretching east-southeastwardly from the southern point of the yellow sandstone bluff, which is just west of the valley, half-way across the anchorage. This reef breaks the westerly swell somewhat, and small craft may anchor on the line between its eastern extremity and the eastern edge of the bluff in twelve feet of water over sandy bottom, but it is dangerous. Inside of the reef there is a depth of three fathoms; outside, a depth of six fathoms. The reef in one place shows bare at extreme low water, and the eastern patch has only four feet of water upon it. It is marked by breakers and by kelp to the eastward. There is also kelp close under the southern point of the anchorage.

East of the line of bluffs at the anchorage is the low opening of the valley of San Juan Capistrano, with a lone aliso or sycamore tree two hundred yards inside the beach; outside of this is a boat house on the beach. Opposite this tree and boat house the usual landing is made in smooth weather, and lumber is rafted ashore. One lumber schooner has anchored in fifteen feet of water, over sandy bottom, abreast this sycamore tree, with the Mission open to the westward. In 1884 there was a *mooring-buoy* in four fathoms, three hundred and twenty-five yards broad off the beach to the southeast. This buoy was gone in 1886. From the buoy, the boat-house inside the beach, near the point of the cliffs on the east side of the valley, bore north eighteen degrees east (N. 18° E.), distant five hundred yards; and the sycamore tree, to the northwest of the boat house, bore north seven degrees east (N. 7° E.), distant seven hundred yards. From this position, the visible rocks off the western part of the sand beach bear west (W.), distant three hundred and seventy yards.

The cliffs on the east side of the opening of the valley rise to a height of one hundred and twenty feet, and continue of the same height to the eastward. From this line of cliffs, which is broken by deep, narrow arroyos, the table-land rises gradually to two hundred and twenty feet in half a mile, and then rapidly to eight hundred and sixty feet in two miles.

Along the base of the western cliffs, half a mile within the extremity of Point San Juan Capistrano, there is a narrow breadth of sand beach, bare at ordinary low water; but at extreme low tides a line of shingle shows along the shore of this anchorage to very nearly abreast the sycamore tree mentioned above. Through this line of shingle the Mission padres opened a boat-landing under the cliffs, a little less than half a mile northeastward of the cape, where the shore is rather sharply indented, and drawing the hides to its edge tumbled them over to the beach, whence they were taken through the surf. This was the old embarcadero. It is a curious fact, illustrating how moderate are the southeast gales south of Point Concepcion, that this open space has never been obliterated by the shifting of the shingle on either side.

Pelican Rock lies close under the face of this line of cliffs, with three fathoms of water close up to it on the south.

The geographical position of the Coast Survey station, on the highest part of Point San Juan Capistrano, two hundred and eighty feet above the sea, is:

Latitude	33°	27′	14″.5 north.
Longitude	117°	42′	37″.1 west.

This is about one and three quarters miles west of the anchorage.

The valley of San Juan Capistrano is narrow, and comes upon the sea between rolling hills of six hundred feet elevation on the west and eight hundred and sixty feet on the east. Two and one half miles up this valley is the village of San Juan Capistrano, with the ruins and out-buildings of the mission of the same name, which is a rather poor mark and on a very limited line of sight for vessels approaching the anchorage in clear weather. The white buildings are well defined against the dark, bold hills, and, as seen from the bay, the village looks somewhat like the old village of Santa Barbara for situation. It bears north five degrees east (N. 5° E.) from the deepest part of the bight at the anchorage. Beyond the Mission, the valley expands into a rich grazing and agricultural country. The village is on the stage and telegraph line between Los Angeles and San Diego. The old Mission was founded in 1776, and in September, 1812, the church was thrown down, soon after its completion, by an earthquake, and forty people were killed. The five great shocks of this earthquake also destroyed the missions of San Ynez and La Purisima.

The *coast from San Juan Capistrano to Newport Bay* is very free from known hidden dangers. It is moderately compact and bold, with rocky cliffs from forty to one hundred feet high. Here and

there are narrow mesa lands, but generally the land rises in long ridges transverse to the coast line and separated from each other by deep, narrow arroyos. Within a mile or two back from the shore the ridges reach as much as eleven hundred and sixty feet, and all the surface is treeless. Niguel Ridge is nine hundred and forty feet high at three and a quarter miles from Point San Juan Capistrano and one mile back from the shore, and San Joaquin Ridge is eleven hundred and sixty feet high at ten miles from the same point and two and a half miles from the shore. In winter the hills are beautifully green; in the dry season they are brown. Between the rocky points there are several low-water sand beaches, but only six short high-water sand beaches.

Only one *hidden danger* is reported. It lies very close inshore at the mouth of the Cañada de las Lagunas, six miles northwest from Point San Juan Capistrano and half way to Newport Bay. It is barely three hundred yards from some visible rocks at the west side of the cove, and falls inside the general direction of the shore line.

There is a slight indentation in this coast line at two miles northwestward from Point San Juan Capistrano, locally known as *Mussel Cove*. It is only three hundred yards deep, with an entrance four hundred yards wide between the two heads. The eastern head is eighty five feet high; the western head is forty feet high, and is an islet at high tide. There is a low water sand beach under the northeastern bluff, and a small rock at the southeast part of the cove.

At six miles from Point San Juan Capistrano is another slight indentation at the mouth of the deep, narrow Cañon de las Lagunas. The cliffs break down from sixty feet to a sand beach at high water, four hundred yards long. On the west side of this little bight there is a long rocky point under the forty-feet cliff, with visible rocks stretching out for two hundred yards, and a sunken rock lying three hundred yards from the nearest shore. On the sloping land at the southeast side of the mouth of the stream is the small settlement of Laguna, which is quite a summer resort. The houses and a large flag staff afford local identification.

Abalone Point.—At seven and three quarters miles from Point San Juan Capistrano, a slightly projecting rocky point has two heads six hundred yards apart. The southeastern one is the smaller and rises to one hundred and forty feet, with a depression of sixty feet behind it. The northwestern hillock rises to one hundred and eighty feet, and has a neck eighty feet lower inside. To the eastward of the first head, a little cove has a high water sand beach; and a quarter of a mile to the northwest of the larger head, there is a short high-water beach at the west side of the mouth of a deep arroyo.

NEWPORT BAY.

This small bay is twenty one miles from Point San Mateo and thirteen and a half miles from Point San Juan Capistrano. From Point Fermin it bears south eighty seven degrees east (S. 87° E.), distant sixteen miles. Looking from seaward, with the low plains in front, it is closed under the hills forming the eastern boundary of these plains. A good landmark for making the bay is to bring the double peaked Santiago Mountain, which lies about twenty-five miles back of the coast-line, to bear northeast (NE.) when the entrance to the bay is directly under it.

Newport Bay was known to the Spaniards as the Bahia de San Joaquin. The bay is a long and narrow cut into the high mesa land on the west and the slightly higher hills on the east. Its general direction is north for three miles, when the head turns sharply to the east for half a mile. The greater part of the bay is closed by marsh land, but a channel winds through to the head. The entrance is masked by a long line of low sand dunes, which extend three quarters of a mile seaward from the general curve of the fast land, and form a barrier two or three miles long across the front of the bay. Behind this narrow line of sand the Santa Ana River comes for two or three miles from the westward under the face of the mesa. This river and the waters of the bay empty through the same channel, which cuts through the sand dunes very near their eastern limit, where they join the line of broken bluff, which is about sixty feet in elevation. At the time of the topographical survey (1875) this entrance was within five hundred yards of the eastern end of the sand dunes, and the channel through it was north by east (N. by E.) for half a mile, running directly for a partially broken bluff to within two hundred and fifty yards thereof, and then turned abruptly to the westward, keeping close to the sand dunes on the south with a broad stretch of shoal water and marsh to the north. A little over one mile inside the entrance there is a small islet one hundred yards across and ten feet high. When within three hundred yards of this islet the channel turns to the northwest for Newport Landing, which is three-quarters of a mile distant on the southeast point of the mesa land and marked by houses.

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Point San Juan Capistrano, E. by N. ¼ N., 17 miles.

Santiago Mountain, double peak,
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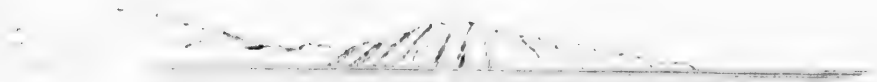
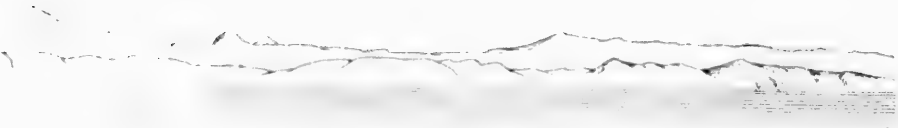


Mount San Onofre, 1,725 feet, east 27 miles.



Point San Juan Capistrano.

Santiago Mountain,
NE. 29 miles, 5,682 feet.

Santiago Mountain,
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First Gulch south of San
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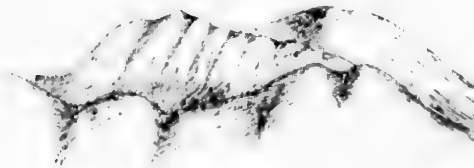

Santiago Mountain, 5,682 feet, N. 78° E. (38 miles from S
Snow; details in binocular.

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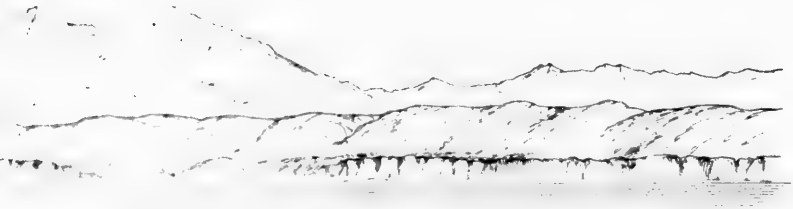

First Gulch south of San Juan Capistrano:
tiago Mountain 27 miles: 5,682 feet;
Gulch N. ¼ E., 2 miles.

8 feet, N. 78° E. (38 miles from San Pedro).
details in binocular.

The channel has changed (1883) entirely since the survey of 1875. There is now no sand-spit on the east side of the entrance at high water, but at low water there is a sand bank there with a swash channel between it and the rocky point. In entering, this sand bank—which the steamship company has marked by a red buoy—is left on the starboard hand, but very close aboard. After passing this red buoy, the steamer runs for a short distance to the left (or westward) of the rocky point and close to it, because the point from the west spit makes out so far that a vessel is obliged to make a very sharp turn, and in doing so her stern swings in over the sunken rocks just inside the rocky point. Thence there is a good channel to the wharf. In going out it is impracticable to make the sharp turn just mentioned without letting go an anchor and allowing the steamer to straighten out to it against the flood tide.

Local knowledge is required to enter and follow the channel, because the entrance changes after each blow. It is dangerous for boats to enter except on the flood. Formerly ranges were moved to indicate the position of the bar to the coasting steamers, but now a local pilot comes out in his dory to meet the incoming steamer, and very adroitly he manages to cross the bar when it is breaking by watching for a favorable moment. Fortunately the bar is very short. There is from three and one-half to four and one-half feet on the bar, and coasting steamers drawing seven and one-half feet enter at the spring tides to bring in lumber, etc. No schooners load here. There is one wharf, warehouses, and seven or eight small shanties near them. The fresh water is brought from a spring at the head of the bay.

At the extreme west-southwest point of the west spit, two and one-half miles westward from the entrance and one and one-quarter miles southwest from the landing inside, the line of sand dunes makes a turn to the west northwest. At this angle of the shore-line the waters of the bay come within one hundred yards of the ocean at high water. Here the sea does not break heavily on the beach, and the pilot's boat is launched on the outside beach when he can not cross the bar. At this point the hydrography has developed the head of a deep submarine valley, where the line of ten fathoms comes within three hundred and fifty yards of the beach and fifty fathoms within five sixths of a mile. Westward of this submarine valley, and four to six miles off shore, there is a plateau with shoal water, from ten to thirty fathoms, over fine gray sand, throughout San Pedro Bay; eastward the depth drops off into two hundred fathoms four miles off shore, with brown and green mud. It is said that this submarine valley can be readily made out from the hills above on account of the discolored water on either hand.

There are no dangers in approaching the bar from the westward if you keep the beach three-quarters of a mile distant in about six or seven fathoms, over gray sand. The water deepens rapidly after passing Point Lasuen, and a depth of one hundred fathoms, with blue and green mud, is within one and a quarter miles southward of the Newport bar, being in the deep submarine valley already described. The usual anchorage for vessels remaining outside is either to the east or west of the bar, in eight to ten fathoms of water and one quarter of a mile from the beach.

The channel across the bar changes at every spring tide, whilst the depth remains about three and a half to four and a half feet. A good landmark for this vicinity is Santa Ana or San Jacinto Mountain, very high and double peaked.

Tides.—The mean rise and fall of tides may be taken as the same as that of Anaheim Landing, where it is four and three tenths feet, and the greatest range of high and low waters seven and three tenths feet.

Wharf at Newport.—To avoid the dangers of crossing the bar at Newport, a very substantial wharf has been constructed seaward from the outermost part of the beach to the westward of the entrance to the bay. The point was chosen because it is at the head of the deep sub-marine valley which carries five fathoms of water within three hundred and thirty yards of the shore. The wharf is nearly three hundred yards long, sixty feet wide at the outer part, and is nineteen feet above high water. Its general direction is southwest by south, and at the outer part we found thirty feet of water at the end, and sixteen and seventeen feet of water about eighty yards on either side towards the shore (February 22, 1889). Outside of the wharf a large mooring buoy is placed in ten fathoms of water on the inner edge of the plateau to the westward, which carries five to six fathoms of water. Between the buoy and the wharf the depth is eighteen fathoms. The buoy lies two hundred and twenty five yards southwest from the southeast angle of the wharf.

This wharf stood the severe gales of the winter of 1888-'89 without damage. A railroad is being constructed from the wharf to Santa Ana.

Newport Landing, about two miles inside the entrance and on the southeast face of the high mesa land, is a place containing a few store houses, a wharf, and a few shanties. Thence roads run to Anaheim, Santa Ana, and other points.

The geographical position of Newport Landing is—

Latitude	33° 37′	north
Longitude	117° 54′	west

In 1875 the bar of the entrance bore south fifty degrees east (S. 50° E.) from Newport Landing.

POINT LASUEN.*

Twenty miles north sixty-five degrees west (N. 65° W.) from Point Capistrano and fourteen miles north eighty-six degrees east (N. 86° E.) from Point Fermin, is the low bluff, nearly two miles in extent, named Lasuen. It is the shore termination of the long, rolling, bare hillock called Los Bolsas.† This long, flat ridge reaches an elevation of one hundred and nineteen feet. To the eastward of it lies the Santa Ana River and adjacent low lands, and to the westward, low lands cut up by a series of marshes and large lagoons, emptying into the sea through very shallow channels. This point forms the eastern limit of the Bay of San Pedro.

Vancouver placed Point Lasuen about twelve miles east by south (E. by S.) from Point Fermin, and describes it as a low point forming the east point of a small bay, or cove, in the southeast part of San Pedro Bay. He was seven miles south, forty degrees west (S. 40° W.) from it. We have plotted his position as it is given, both by latitude observation and by bearings on Point Vicente and Santa Catalina. He evidently mistook the low, marshy lands to the west of it to be a recession of the shore of San Pedro Bay.

Four large lagoons open upon the ocean between Point Lasuen and Point Fermin, within which bounds we reckon San Pedro Bay. The first opens about three miles west-northwestward from Point Lasuen and twelve miles east by north (E. by N.) from Point Fermin. It drains a low country through a small stream, probably an old ramification of the Santa Ana River. It is about two and a half miles long and separated from the ocean by a narrow strip of low sand beach, over which the sea washes in places in heavy storms from the northwest and southeast. The lagoon has a breadth of only a few hundred yards and a mouth about fifty yards in width, with a narrow bar upon which there is a very heavy break at all stages of the tide, rendering it dangerous to cross in boats of any kind. There is no safe anchorage off the entrance, and it is exposed to the usual winds.

Hence to the second lagoon the beach is low and the land behind it marshy for miles. In winter the country is widely covered with water.

ANAHEIM LANDING.

Six miles north fifty seven degrees west (N. 57° W.) from Point Lasuen and nine and a half miles north sixty six degrees east (N. 66° E.) from Point Fermin lies the entrance to the second lagoon, at Anaheim Landing. From the anchorage at San Pedro it bears north sixty eight degrees east (N. 68° E.), distant eight and a half miles. The northwestern side is marked by a low bluff rising from ten to twenty feet above the uniform flat ground.

The lagoon lies southeast of this bluff, and the entrance is under the eastern part and is known as Anaheim Creek. The bar of the entrance had, in 1868, two or three feet of water upon it at low water, but vessels do not attempt to cross it, and boats cannot enter at low tide. A large beacon has been erected near the landing as a mark for making it, and several large, white warehouses afford easy means of recognizing the landing.

There are no dangers in approaching this place. The water shoals gradually to the anchorage in four fathoms, over fine gray sand, when a little more than half a mile from the beach. At two and a quarter miles from the beach the depth is ten fathoms, over coarse sand. There is a low, treeless hill nearly one mile back of the landing, and on the beach a white frame beacon. This beacon is an open scaffolding about thirty feet high, and is used to carry a light, which is shown when steamers are expected at the anchorage. If a steamer approaches the anchorage and does not see the light it is a sign that the lighters are not ready with freight. Lighters receive and discharge cargo at the outer buoy and are then hauled to the inner buoy, thence over the bar

* Named by Vancouver, in 1793, after Fermin Francisco de la Suen, the father president of the missions of Alta California.

† Vizcaino has the legend Costa Boxa in this vicinity.

at high water to the wharf, which is on the west side and nearly three hundred yards inside the point.

The outer buoy is in twenty-one feet of water, distant one thousand and fifty yards south seventy-one degrees east (S. 71° E.) from the beacon and eight hundred and eighty yards from low-water mark on same bearing. The inner buoy lies in twelve and a half feet of water, and is five hundred and fifty yards north eighty two degrees east (N. 82° E.) from the beacon and three hundred and fifty yards from low-water mark on same bearing. On the bar there is four feet of water (January, 1875).

The geographical position of the beacon is:

Latitude	33°	44′	11.2 north.
Longitude	118°	05′	58.5 west
Or, in time	7h	52m	23.9

The magnetic variation was 14° 38′ east in January, 1885.

This place is abandoned (1883) and the lighters and moorings removed.

The town of Anaheim lies ten miles to the northeast of the landing, and is the center of a large grape-culture. In 1880 it had a population of 883, and it is connected with Los Angeles and San Francisco by rail.

Tides, Anaheim Landing.—To find the times and heights of high and low waters, apply the following corrections to the times and heights for San Diego, given in the Coast and Geodetic Survey Tide Tables, published each year. For the time of high waters add fourteen minutes, and for low waters add nine minutes; for height of high waters subtract two-tenths foot, and for low waters subtract three tenths foot.

The third lagoon receives the waters of the *Coyote Creek* and the new *San Gabriel River*. It lies about three miles west northwestward from Anaheim Landing, and north fifty-five degrees east (N. 55° E.) nine and a half miles from Point Fermin. The low, treeless hill, three hundred and fifty five feet elevation, lying four or five miles northwest of the third lagoon, is Los Cerritos.

The *San Gabriel River* flows into the *Los Angeles River* ten miles from the coast, in the low plains, and empties into San Pedro Bay north twenty-six degrees east (N. 26° E.), distant five miles from Point Fermin. Near the western end of the forty-foot bluff between the third lagoon and the mouth of this river there is a fine large building, recently erected (1885), which forms a good landmark along this low shore. It lies north forty-two and a half degrees east (N. 42½° E.), four and a half miles from Deadman's Island.

The *San Pedro Wind gap* lies between the San Pedro Hill and the Sierra San Juan to the eastward, and the summer winds draw directly over the extensive plains, causing the westerly swell to roll upon the low, sandy beach with great force. In winter the southeast and southwest swell breaks upon the same shores with such violence as to prevent any vessel discharging or receiving freight at Anaheim Landing, and even to prevent a vessel riding at anchor off it, unless well-found with ground tackle.

SAN PEDRO BAY.

This crescent-shaped bay lies between Point Lasuen and Point Fermin.* From the latter to the former the course is north eighty-six degrees east (N. 86° E.), and the distance fourteen miles. Between these two points the low, sandy shore retreats nearly five miles to the northward just eastward of the mouth of the Los Angeles and San Gabriel Rivers. But before describing the bay we give the landmarks for making it.

San Pedro Hill.—This is one of the most prominent landmarks on the coast, and is the distinguishing feature for making San Pedro Bay and Wilmington Harbor. The southeastern face forms the western boundary of San Pedro Bay, and thence it stretches in a high, bold ridge west by north (W. by N.) for nine miles.

The south shore of San Pedro Hill forms part of the north side of the San Pedro Channel, seventeen miles wide, between the main coast-line and the island of Santa Catalina. The general direction of the hill is parallel with the longer axes of Santa Catalina, San Clemente, and San Nicholas Islands. In approaching it from the westward or southeast, it is made as a smooth, moderately round topped mountain, and is first made out when a vessel is abreast Point Mugu; from the southwest it is made out as a long, flat-topped mountain when nearly forty miles distant.

* Vizcaino's chart (Sutil y Mexicana) calls this bay "Ensenada de S. Andres," and El Morro or Deadman's Island, "I. rasa de buena gente." Cabrera Bueno names it San Pedro Bay.

It is a grass-covered, treeless ridge, rising to an elevation of one thousand four hundred and ninety-three feet* in a little over a mile from the south shore. The crest of the ridge lies nearly parallel to the south face of the cliffs at its base, and two and a half miles from its summit the southeastern extremity forms Point Fermin. The ocean shores of this mountain are steep, rocky cliffs, about sixty feet above the sea; and between these and the summit is a succession of five or six horizontal terrace lines cut in the rock and well exhibited in the topographical map. In the spring these lines of terraces are peculiarly well marked by the brighter lines of gay flowers. The eastern extremity of the ridge is flanked by an extensive mesa, or table land, rising from sixty feet on the shores of San Pedro Bay to about one hundred feet at the foot of the hill one mile distant.

To the northward of the mountain stretch the extensive Los Angeles plains to the foot-hills of the Sierra Madre, of which the highest peak is San Antonio, distant forty five miles, and reaching nine thousand nine hundred and thirty-five feet elevation. It is generally snow-clad from November to February.

POINT FERMIN.†

This is the bold, rocky bluff, one hundred feet high, forming the southeastern extremity of San Pedro Hill, just described. Behind it the land rises in plateaux to the summit of the mountain. Upon the southeasternmost extremity of the point is situated the light-house. From the light-house the bluff runs for about half a mile west-northwest (WNW.) to Point Pedro, which is a rounding and not very well-defined point; thence the shore line runs very nearly north for about two miles, with bold cliffs averaging sixty feet in height. Whenever the beach shows along the foot of these cliffs it is generally bounded by shingle, although much was removed in constructing the breakwater. Westward of Point Fermin the coast is very bold and rugged for six and a half miles, to Point Vincente. The light-house on Point Fermin and the dangers off it are described elsewhere.

San Pedro Bay.—The whole area of this bay is a plateau, with depths ranging from twenty fathoms at six or seven miles off the northernmost part of the bight to four or five fathoms half a mile off the low shores. The limits of the plateau have not been determined, but the indications are that the drop off is very sudden into one hundred and two hundred fathoms. Throughout the plateau the soundings give fine gray sand, with occasional patches of gravel and mud, except off San Pedro, where it is blue mud. In one hundred fathoms, and deeper, the bottom is green mud. Two and a half miles south of Point Fermin the depth of water uniformly decreases to thirty fathoms over sand and mud, and then in a few hundred yards drops suddenly to two hundred fathoms and more, with sand and mud bottom. Vancouver noted this great depth so close inshore. Off the south face of San Pedro Hill the depth ranges from one hundred fathoms, one mile outside Point Vincente, to fifteen fathoms, one mile outside Point Fermin.

One and three-quarters miles northward of Point Fermin, abreast of the cliffs, is a small islet named El Morro, but locally known as *Deadman's Island*.‡ It was about sixty feet in height and one hundred yards in extent, but has been cut down to supply rock for the jetty hence to the low line of sand dunes known as Rattlesnake Island. The islet lies one-third of a mile off shore, and between it and the main-land is the entrance to the channel leading to the small lagoon behind Rattlesnake Island, known as Wilmington Harbor, and elsewhere described.

From Deadman's Island the north shore of San Pedro Bay sweeps in a long curve to the northeast, east, and east-southeast to Point Lasuen. The entrances to the lagoons in this long, low coast-line have already been described on page 36.

San Pedro Bay is well protected in every direction, except against the winter gales from the southeast round to the southwest. During the spring, summer, and autumn months it is an excellent roadstead. It is nearly free from dangers, and there is nothing to be feared outside of one-quarter of a mile from the shore-line in the bay or approaches. We note the following:

Dangers off Point Fermin.—There is a *sunken ledge* off Point Fermin that has three, seven, eleven, and fourteen feet of water upon it, but it lies inside the limits of the body of kelp at this point. The shoalest point of the rock lies six hundred yards south sixty-six degrees east. A *danger*

* Belcher states this hill to be "about five hundred feet above the sea."

† Named by Vancouver in November, 1793, after Fermin Francisco de la Suen, the father president of the missions of Alta California. On his chart, however, it is erroneously engraved "*Pt. Fermin*."

‡ This islet is first laid down by Vizcaino, and he has the word "Rosa" near it.

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San Pedro Hill, 1,475 feet.

Sand dunes.
Santa Monica Bay

Sand dunes

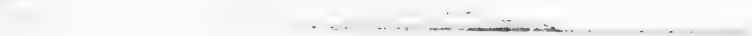
San Pedro Hill, 1,475 feet

475 feet.

Point Vincente, E. by S. ¼ S., 11 miles.

Sand dunes.

Santiago Mountain, 5,682 feet,
E. ¼ N., 54 miles.



ll, 1,475 feet, is also seen. E. by S., 24 miles.

San Pedro

has been very recently found in the open bay of San Pedro by a ship dragging over it in heavy southeast weather in the spring of 1887. It lies in five fathoms of water where the bottom of sand seemed quite uniform, but in the examination two points were found, quite close together, with eighteen and nineteen feet of water upon them and a small patch of kelp over them. This danger has never been seen to break, and it is not certain whether it is a rock *in situ* or a ballast-heap dumped from some ship.

From this danger the bearing to Deadman's Island is north sixty-eight degrees west (WNW.) and the distance three-eighths of a mile; and Point Fermin Light-house bears south fifty-two degrees west (SW. ½ W.), distant very nearly two miles. There is a thick, but small, field of kelp three-eighths of a mile from this danger on the line to Point Fermin Light-house, south sixty-six degrees east (S. 66° E.) from the light-house on Point Fermin, and south thirteen and one-half degrees west (S. 13½° W.) from Point Pedro, whilst Deadman's Island is open past Point Pedro about two and one-half breadths. This rocky patch lies about five hundred yards broad off the bluff, just east of Point Fermin, and has six fathoms east and west of it, and from three and a quarter to four and a quarter fathoms between it and the shore. It appears to be the outer limit of a ledge two hundred by one hundred yards in extent, deepening towards the shore. The southern tail of this danger, with five fathoms upon it, lies about half a mile southeast of Point Fermin.

In September, 1888, the British ship *Respigadera*, with a fair wind and flood-tide, tried to pass Point Fermin too closely and struck on the sunken rock off it and became a total wreck.

Two other *sunken rocks* lie off Point Pedro; one is two hundred yards east of Point Pedro, and has five feet of water upon it, with ten feet all around it. The second sunken rock lies four hundred yards north thirty-seven degrees east (N. 37° E.) from Point Pedro and three hundred and fifty yards from the nearest bluff. It has three feet of water upon it and ten feet around it. These two dangers are among the kelp and inside the twelve-foot curve.

Crapo Rock.—This danger has been known for several years, but its position and the depth of water upon it have only recently been determined. It lies about three-quarters of a mile east-southeast from Deadman's Island.

It has seventeen feet of water upon it, and three other points lie close inside of it. One of these points has nineteen feet of water over it, and the others have three and a half fathoms. The farthest one is fifty yards to the westward. There is usually a small patch of kelp about it, with four and a half fathoms of water close under the danger and around the other points.

Buoy.—To mark this danger, upon which the *Crapo* and other vessels have struck, a *bell buoy*, painted with *red and black horizontal stripes*, has been anchored in six fathoms of water over red sandy bottom, and only fifty yards south from the rock. The bell gives from twenty-eight to thirty-two blows a minute at irregular intervals. It sometimes stops for two or three seconds, and then follows a series of light but rapid strokes. The striking apparatus is a ball rolling in radiating grooves from a central space on a small platform on the plane of the rim of the bell. It is a very clear sounding bell.

The following bearings and distances locate this danger: From it Deadman's Island bears north seventy degrees west (N. 70° W.), distant seven-ninths of a mile; and Point Fermin Light-house bears south fifty-two degrees west (S. 52° W.), distant almost two miles. The rock lies to the northward about eighty-six yards.

GENERAL SAILING DIRECTIONS.

Vessels coming from the westward through the Santa Barbara Channel make San Pedro Hill (one thousand four hundred and ninety-three feet elevation), forming the west side of the Bay of San Pedro, as an island; but if approaching it from off shore to the southward of the Channel Islands it will be seen projected against the mountains far distant to the southward and eastward. Approaching Point Vincente (page 45), which is the southwest point of San Pedro Hill, high and bold, vessels can keep it close aboard on the outer edge of the kelp. The ten-fathom curve keeps within half a mile of the shore for six miles to Point Fermin, close off which is broken ground for six hundred yards, but within the line of kelp.

Steamers and sailing vessels may safely round Point Fermin within half a mile of the cliffs when south of the light-house, increasing the distance from the cliffs to five-eighths of a mile when Point Pedro bears west and decreasing the depth from twelve to six fathoms. This will carry them outside the mass of kelp off the Point. When the light-house bears north by west (N. by W.), distant half a mile, Deadman's Island will begin to open from Point Pedro, and when the light

bears west southwest (WSW.) and Point Pedro east (E.), distant five-eighths of a mile, Deadman's Island will bear north half west (N. ½ W.), distant one and one-eighth miles.

From this position steer north by east half east (N. by E. ½ E.) for the steamship company's mooring buoy, which lies in five fathoms, distant seven-eighths of a mile, and just off the entrance to the harbor.

If the vessel is feeling her way in along the outer edge of the kelp in thick weather, she knows by its change of direction and its not continuing further that she is abreast the Point, and on leaving it a course of northeast by north half north (NE. by N. ½ N.) will carry her to the mooring buoy. Lately a small field of kelp has been located about one-quarter of a mile south of the mooring buoy.

This mooring buoy lies over a bottom of fine gray sand and broken shells, with Point Fermin Light-house showing over Point Pedro and bearing southwest (SW.), while Deadman's Island bears northwest (NW.), distant not quite half a mile. Three-eighths of a mile nearly east by north from the mooring buoy is the eighteen-foot danger already described.

Vessels coming from the southeastward with northwest winds beat in boldly, but not nearer than one mile from the low sandy beach forming the north shore of the bay, off which five fathoms can be had at that distance. Keep the lead going if the weather is hazy or foggy. The current along the coast moves to the westward in this part of San Pedro Bay.

One of the landmarks when working along this shore is the new Long Beach Hotel, a very prominent white structure, built on the thirty-foot bluff at the edge of the water, one and three-fifths miles eastwardly from the San Gabriel River. This building lies four and a half miles north forty-two degrees and forty minutes east (N. 42° 40' E.) from Deadman's Island, and it will frequently be seen in hazy and foggy weather, when the low shores can not otherwise be readily made out.

The large, deep-laden ships anchor to the east and northeast of the steamship mooring buoy, at half a mile distance, in from four to six fathoms, with good holding, sandy bottom. Care must be taken to avoid the eighteen-foot danger three-eighths of a mile eastwardly from this buoy.

In winter, vessels must anchor further out and more to the southward, in order to be able to slip their cables and go to sea should a heavy southeaster spring up, with large swell from the southwest; but a vessel well found in ground tackle is perfectly safe. In December, 1872, we saw the clipper-ship *Tornado* ride out a very heavy southeast gale of three days' duration. In favorable winters there is scarcely a day when passengers and freight can not be disembarked if the vessel does not go inside.

The *Santa Ana Wind.*—At San Pedro Bay and some distance to the eastward there is occasionally experienced a very strong wind without swell, which comes from or through the valley of the Santa Ana, lying about twenty-five miles to the northeast by east. As the wind blows over the plains its general direction is nearly east northeast, and it is a warm, very dry wind, blowing furiously and raising great clouds of dust. It may not occur for a whole year, and usually comes in the fall of the year.

This wind blows very strongly across San Pedro Bay and makes the western side a lee shore; some vessels, whose ground tackle was too light, have dragged on shore near Point Fermin.

In November, 1888, during the Santa Ana wind [illegible] a reverse current of wind was drawing along the shore from Anaheim Landing towards Newport Bay. In February, 1889, the wind was blowing over thirty-five miles per hour six miles from Anaheim.

Electric Lights.—Under favorable atmospheric conditions [illegible] electric lights on the higher points of Los Angeles will be visible in the Bay of San Pedro. Four of these lights have heights of one hundred and ninety-eight to five hundred and sixty-three feet above the sea, and if they are bright enough should be seen in approaching the bay. [illegible]

[illegible]

The waters of the [illegible] of Deadman's Island, and the [illegible] point half a mile west of it, through a channel [illegible] constructed by the United States to furnish a [illegible] gers and freight at the wharf of Wilmington. The [illegible] is one and a quarter miles in length, and lies nearly parallel with the main [illegible] The construction of wharves and railroad lines on the west shore [illegible] At the entrance [illegible] has been

contracted by a short stone jetty from the western main shore. This jetty apparently throws the main channel close alongside the island. In coming out we noticed that the steamer had to haul very close around the west side of Deadman's Island.

The line of the jetty is delineated by marks used by the engineers; and from Deadman's Island for three or four hundred yards to the higher part of the jetty, the top is two or three feet below the surface of the high waters. The high waters also cover the short jetty which is on the west side of the entrance.

There is a bar forming outside the end of this west jetty and well in towards the bluff. The swell readily breaks on this deposit.

The depth of water on the rocky bar at the entrance to the channel was only two feet up to 1871, when the building of the jetty was commenced. This improvement to the navigation has given a depth of ten feet in a channel three hundred feet wide; and the deepest draught steamer which has entered it directly drew fourteen feet, going in before or after high water.

Inside of this artificial channel the passage-way through the lagoon to Wilmington is very narrow and crooked and marked by buoys and beacons; but since the projection of the railroad across Wilmington Lagoon, and under the main shore parallel with the jetty, the town of San Pedro has suddenly sprung up at the mouth of the first cañada, one mile inside the artificial channel, and will eventually spread over the mesa lands towards the old site of San Pedro. Wharves for shipping and railroad purposes have been constructed and carried towards the entrance to the channel, and it seems that Wilmington will lose much of its importance as a shipping point. Among the later developments in Wilmington Lagoon is the building of a new branch of the railroad parallel with and east of the present one, as far as Mormon Island, where a long line of wharf is to be constructed.

SAILING DIRECTIONS AND BUOYS FOR SAN PEDRO AND WILMINGTON HARBORS.

After passing Point Pedro irregular patches of kelp will be passed through for about a quarter of a mile off that Point. The bottom is dark gray sand and green mud. If it is low water, and the vessel draws more water than is on the bar at the entrance to San Pedro Harbor, she lies at the mooring buoy until the tide rises and then goes in, or lies there and sends her passengers and freight ashore in the tug and barges.

If there is sufficient water on the bar, the vessel rounds the mooring buoy on its eastern side and then steers northwest by west (NW. by W. for the entrance of the channel, this course lying one diameter of Deadman's Island to the westward of the island and nearly half way towards the first black buoy. (For description of this and all the other buoys and beacons, see page 42.) Pass between the island and this outer black buoy; but as the channel now runs so close under the south and west shores of the island the helm must be put hard aport and the ship kept within a ship's length of the island, passing close around the red buoy under the rocks of the island on the starboard hand. In passing this red buoy, the second black buoy at the outer end of the western jetty, or training-wall, will be close on the port hand. When between these two buoys steer northwest by north (NW. by N.) three-eighths of a mile to the second red buoy, which is placed on the eastern side of the channel at the end of a wing dam running into the channel from the main jetty. Thence the course is northwest by west (NW. by W.) for seven-eighths of a mile to the railroad wharf on the northwestern side of the channel.

After the steamer is loaded and the passengers aboard she goes out when the tide serves, being warned by a floating staff at the station building on the wharf, where the depth on the bar is always shown. If the passengers have not arrived from Los Angeles, she goes out to the mooring buoy and lies there until the passengers and freight are brought out in a tug to her.

The railroad wharves and improvements are very extensive and substantial, and all freights of iron, coal, lumber, and merchandise are discharged here from the ships and carried away by rail, but large coal ships and other deep-laden vessels discharge into lighters at the anchorage outside, and these lighters are towed in. Lumber vessels generally discharge part of their cargo outside and enter the harbor as soon as their draught enables them to do so.

The railroad wharf at San Pedro, inside the jetties, built from Wilmington Harbor, lies north forty-six degrees west (N. 46° W.) seven-tenths of a mile from Deadman's Island. To reach this point of shipment the following aids to navigation have been located:

Entrance.—The *Outer Buoy* off the entrance to the channel, between Deadman's Island and the main shore, lies three hundred yards south one-quarter west (S. ¼ W.) from Deadman's Island.

It is a *second-class nun buoy painted black, numbered* 1, and lies in ten feet of water. It must be left on the port hand in entering.

Entrance.—The *Second Buoy* lies eighty three yards southwest by south half south (SW. by S. ½ S.) from Deadman's Island, and very close under its southwest point. It is a *third-class can buoy painted red, numbered* 2, and lies in ten feet of water. It must be left on the starboard hand in entering.

Harbor.—The *Third Buoy* abreast the red buoy under Deadman's Island is at the southern or outer end of the jetty on the west side of the channel, and lies in seventeen feet of water, over sandy bottom, two hundred and thirty yards southwest by west (SW. by W.) from Deadman's Island. It is a *second class spar buoy, painted black and numbered* 3, and must be left on the port hand in entering.

Harbor.—The *Fourth Buoy* is inside the entrance to the channel, on the port hand, at the northeast angle of the west jetty about three hundred and fifty five yards from the entrance. It is a *second class spar-buoy, painted black and numbered* 3, and lies in eleven feet of water over sandy bottom three hundred and eighty-five yards north sixty degrees west (N. 60° W.) from Deadman's Island. It is to be left on the port side in entering.

It bears north twenty four degrees west (N. 24° W.), distant three hundred and fifty-five yards, from the black buoy at the outer end of the west jetty.

From it the railroad wharf lies north forty two and a half degrees west (N. 42½° W.), distant one thousand three hundred and eighty-five yards; but the channel curves slightly to the northnortheast, for which change the next red buoy is placed, and which bears north eighteen degrees west (N. 18° W.), distant three hundred and seventy five yards from it.

Inside this black buoy the high water shore line stretches well to the west, and the inner bay looks large at high tide.

Harbor.—The *Fifth Buoy* is inside the entrance to the channel on the starboard hand, about halfway between Deadman's Island and the railroad wharf. It is a *third class can buoy, painted red and numbered* 4, and lies in fifteen feet of water over sandy bottom at the extremity of the wing-dam which stretches towards the channel from the long curve of the east jetty. It bears north forty degrees west (N. 40° W.), distant seven hundred and twenty five yards from Deadman's Island, and from it the southeast part of the railroad wharf and buildings lie north fifty-five degrees west (N. 55° W.), distant eight hundred and fifteen yards.

Mooring Buoys.—Although the steam ships now ride to their own anchors, there are two mooring buoys placed inside the [illegible] buoy, which marks the seventeen feet Crapo Rock.

The outer mooring buoy [illegible] and is placed in [illegible] feet and a half fathoms of water, over a bottom of [illegible] gray and red sand. From [illegible] Deadman's Island bears northwest two thirds west (NW. ⅔ W.), distant three fifths of a mile, and Point Fermin Light house bears southwest one half west (SW. ½ W.), distant [illegible] miles.

The inner mooring buoy [illegible] buoy, and is placed in four and a quarter fathoms of water, over a bottom of fine gray sand and shells. From it Deadman's Island bears northwest [illegible] this chart NW. ¾ W., distant [illegible] more than half a mile, and Point Fermin Light house bears southwest [illegible] SW. ¾ W., distant [illegible] miles.

These two buoys and the sunken rock Crapo are nearly in line on a course east two thirds north [illegible] and past the [illegible] south [illegible], the outer stand at two hundred and eight yards. The [illegible] yards [illegible] the range of the moorings and the rock.

Beacon.—Besides [illegible] there is a beacon [illegible] water on the west side of the channel nearly two hundred yards from the railroad wharf. It is nearly in the line of the wharf and the red buoy at the end of the wing dam. It bears northwest [illegible] quarters west (NW. ¾ W.), distant [illegible] hundred yards, from the red buoy, and is marked by a cage on top. On its [illegible] to show the depth of water on the bar.

There is a *red beacon* near the end of the wing dam, inside the harbor.

POINT FERMIN LIGHT HOUSE.

The [illegible] are erected close to the edge of the [illegible] county of Point Fermin, the [illegible] point of San Pedro Bay. As seen from the southward they will be projected against the [illegible] and white [illegible]. The [illegible] are constructed [illegible] of wood attached to the [illegible] and will be [illegible] sash of wood. The dome of the [illegible] painted red, and the remainder of the structure a light [illegible] color. The light was [illegible] established in 1874, and shows from sunset

San Pedro Hol. L 475
Point Vincente
Point Fermin Lt Ho.
1 ¼ N 1½ miles

San Pedro Hill, 1,475 feet, W. by N. ½ N., 5½ miles

Point Fermin Light-hou

Deadman's Island, NW. by W., 4¼ miles
Outer anchorage, San Pedro Bay.

Point Fermin Light-house, W. by N., 1¼ miles

San Pedro Hill, 1,475 feet.

Point Vincente.

Point Fermin Lt. Ho.,
E. ¼ N., 15 miles.

to sunrise. It is a *fixed white light* of the fourth order (system of Fresnel). The base of the tower is one hundred and six feet, and the focal plane of the light is one hundred and fifty six feet above the mean level of the sea.

It shows through the entire horizon, but the light will be cut off by the higher ground to the northwestward, so that the limit of visibility is from north twelve degrees west (N. 12° W.) round by north, east, south, and west to north eighty-five degrees west (N. 85° W.).

Under favorable conditions of the atmosphere it should be visible from a height of —

10 feet above the sea at a distance of 18 miles
20 feet above the sea at a distance of 19.5 miles.
50 feet above the sea at a distance of 20.6 miles
60 feet above the sea at a distance of 23.2 miles

Its geographical position, as determined by the United States Coast and Geodetic Survey, is:

Latitude	33	42	15	north.
Longitude	118	17	30	west.
Or, in time	7h	53m	08s.6	

From the light-house the following bearings and distances are given:

Point Hueneme Light	(not intervisible),	distant 53 miles.
Point Vincente	N. 86 W.,	distant 6¾ miles.
West Point of Catalina Island	S. 34 W.,	distant 21 miles.
Isthmus Cove, Catalina Island	S. 17 W.,	distant 19 miles.
Southeast point Catalina Island	S. 14 E.,	distant 21 miles.
Point Lasuen	N. 85 E.,	distant 14½ miles.
Point Loma Light-house	S. 56 E.,	distant 81 miles.
Point Capistrano	S. 80½ E.,	distant 33¼ miles.

The magnetic variation was 14° 45′ east in 1885.0, with a yearly increase of one minute and three-tenths.

The geographical position of the United States Coast and Geodetic Survey station on the top of Deadman's Island is—

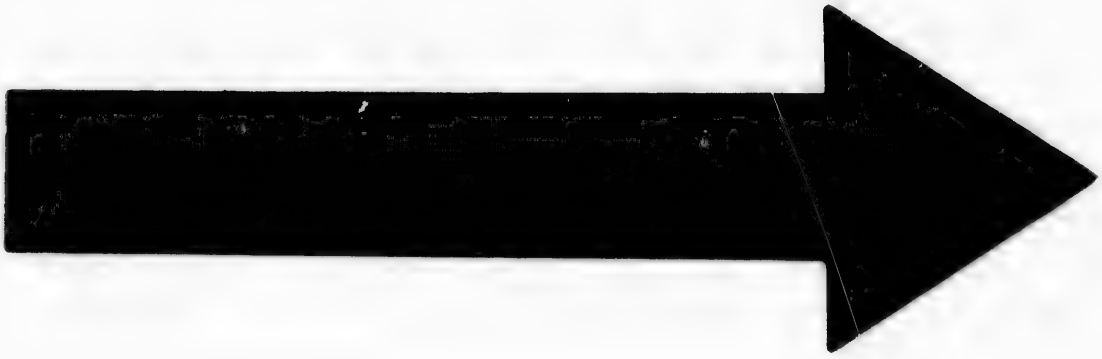
Latitude	33	44	33	.5
Longitude	118	16	11	.9
Or, in time	7h	53m	04s	.8

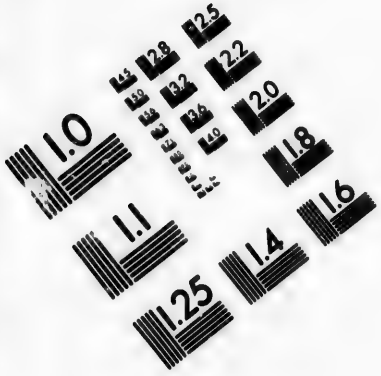
Tides for San Pedro Bay.—The Corrected Establishment or mean interval between the time of the moon's transit and the time of high water is 1Xh 39m. The mean rise and fall of tides is three and seven-tenths feet, of spring tides four and seven-tenths feet, and of neap tides two and two-tenths feet. The mean duration of the flood is 6h 18m, of the ebb 6h 5m, and of the stand 0h 30m. The average difference between the Corrected Establishments of the a. m. and p. m. tides of the same day is 1h 10m for high water, and 1h 4m for low water. The differences, when the moon's declination is greatest, are 1h 55m and 1h 38m, respectively. The average difference in height of these two tides is one and one-half feet for the high waters and two for the low waters. When the moon's declination is greatest, those differences are two and three-tenths feet and three and one-tenth feet, respectively. The average difference of the higher high and lower low waters of the same day is five and six-tenths feet, and when the moon's declination is greatest, six and six-tenths feet. The higher high tide in the twenty four hours occurs about 9h 10m after the moon's upper transit (southing) when the moon's declination is north, and about 3h 16m before when south. The lower of the low waters occurs about seven hours after the higher high tide.

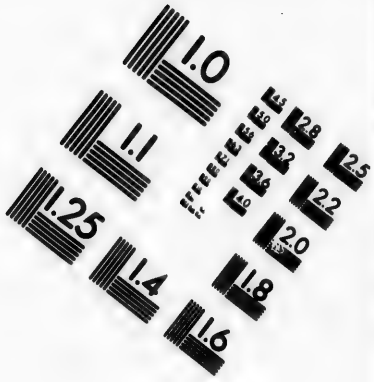
The greatest observed difference between the two low waters of one day was three and nine-tenths feet, and the greatest difference between the higher high and lower low waters of one day eight and four tenths feet.

To find the times and heights of high and low waters apply the following corrections to the times and heights for San Diego, given in the Coast Survey tidal tables, published each year: For time of high water add six minutes, and for low water add eight minutes; for height of high water subtract one tenth of a foot, and for low water add two tenths of a foot.

The City of Los Angeles lies towards the northwestern part of the great plains extending from the shores of Santa Monica Bay as far as San Bernardino, and embracing about one and a half millions of acres of grazing and agricultural lands. To the northward of it lies the wild, abrupt mountain range of the Sierra Madre, attaining an elevation of nine thousand nine hundred and thirty-five feet at Mount San Antonio, and separating these plains and rolling lands from the great Mojave desert north and east of them.







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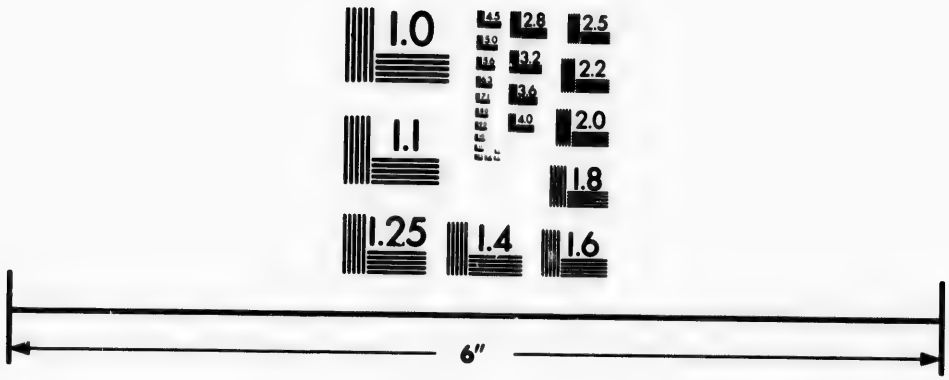

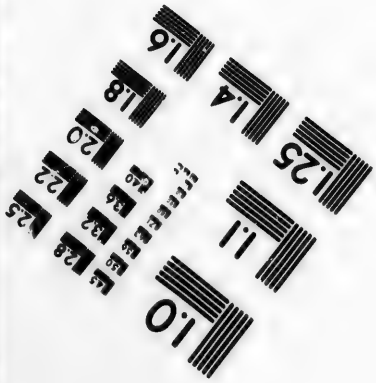

Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

The main part of the town is situated on the right bank of the Los Angeles River, a branch of the San Gabriel, and at the railroad depot has an elevation of two hundred and ninety feet above the sea.

It lies under the eastern and southern flanks of the rolling hills which overlook the town and the plains. It is the center of the grape culture of this region; vast quantities of wine and brandy are annually manufactured there, reaching 3,600,000 gallons in the county during the year.

Extensive orange groves and vineyards are laid out round the town and its environs; the water of the Los Angeles River is used for irrigation, and artesian wells have been successfully bored on the plains. The average rain-fall at Los Angeles for eleven years, from 1874 to 1885, was seventeen and nine tenths inches, with an extreme range from five and three-tenths inches to thirty-seven and two tenths inches.

It is connected by rail with the shipping port of San Pedro, and is on the line of the Southern Pacific Railroad between San Francisco, El Paso, etc. From Wilmington it is distant twenty and one half statute miles north half west (N. ½ W.), and it is thirteen miles eastwardly of the nearest shores of Santa Monica Bay. The town was founded in 1777, under the title and name of "El Pueblo de Nuestra Señora de los Angeles," on the river called "Porcinncula." Upon the acquisition of California by the United States it was the largest town in the country. In 1880 it had a population of 11,300 and at the present date (1885) is probably three times as great.

The Mission of San Gabriel lies about seven and one half miles to the east northeast (ENE of Los Angeles.

The Bay of San Pedro was discovered by Sebastian Vizcaino in 1602, and, although it is not mentioned in his narrative, he has it laid down on his chart, and named the Ensenada de San Andres.

When Vancouver was seeking for San Pedro Bay (November, 1793) he found such deep water off Point Vincente that he thought he could not be near the place, but after getting to the south and east of Point Fermin he had a full view of the bay and anchorage, yet concluded not to enter it.

SAN PEDRO CHANNEL.

The passage between the Island of Santa Catalina and the main shore to the north, including the seaward face and the shores of San Pedro Hill, is known to navigators on this coast as the San Pedro Channel; it is analogous to the Santa Barbara Channel further west. From Point Vincente to the westernmost point of Catalina Island the distance is eighteen and a half miles and the bearing south sixteen degrees west (S. 16° W.). This distance nearly represents the width of the channel. The soundings along the face of San Pedro Hill are very deep, being two hundred fathoms within two miles, and the same off the north shores of Catalina Island; bottom, green mud in both cases. The deepest water of the channel is not yet known. Approached from the southeast or northwest, the great height and mass of Catalina Island, and the moderate height of San Pedro Hill, loom up at many miles distance and give good landfalls in fair weather. All the coasting steamers use this channel, but the steamers for Mexican and Central American ports go outside the islands, unless when coming up the coast against heavy northwesters in clear weather.

In clear weather, when approaching the channel from either direction, the high, mountainous land of the coast ranges is distinctly visible, the very rugged and jagged inner peaks of the Santa Monica range to the northwest, the bold flanks of the Sierra Madre to the north, over the plains of Los Angeles, and the mountain to the northeast with its dark culminating double peak, San Jacinto.

In passing through the channel, the great divide of Catalina Island near its western end is a very marked feature, apparently cleaving the mountainous island into two parts.

The summer winds draw somewhat over the land; they are generally light, and only occasionally breeze up lively, but do not raise much sea. The winter winds blow from the southward and eastward quite strong, with rather more sea and shorter, as if blowing against a current.

We have no current observations in the San Pedro Channel, but by an observation made about thirty miles southeast by east (SE. by E.) from the southeast entrance of the channel, the current was running one-half knot per hour to the northward; and at a station in latitude 33° 43′ N. and longitude 119° 01′ W., being about thirteen miles north of Santa Barbara Island and west-northwest from the northwestern entrance to the channel, the current was running to the west by north

(W. by N.) half a knot per hour. The depth was four hundred and sixty-eight fathoms and the bottom soft mud.

The general temperature of the sea water is five degrees warmer than off San Francisco.

During the summer the channel is generally free from fog during the day, but it comes in with the westerly wind after a few days of warm, calm weather.

Portuguese Bend.—Three and three-quarters miles westward from Point Fermin Light and two and one-half miles eastward from Point Vincente is a slight falling back of the cliffs, with two small, narrow, jutting tongues nearly two miles from Point Vincente. Close under the eastern tongue and in the deepest part of the cove is a Portuguese whaling station, and the cove itself is known as Portuguese Bend. In this cove, on the edge of the kelp which follows the shore-line, the steamers sometimes anchor to discharge freight, etc. The anchorage is in five and one-half to six fathoms and well sheltered. There are several passages through the kelp to the beach, upon which freight is safely landed.

In December, 1884, we anchored here in six fathoms of water, over white sandy bottom, just inside the main body of the kelp and one-third the breadth of the cove from the western point. A shore-field of kelp lies inside, with a space thence clear to the shore. A large field of kelp begins at the east point of the bend and continues unbroken to Point Fermin. The boat landing is in the northwest angle of the cove. During our visit the water in the cove was quite smooth.

Improvements are projected here, and it is proposed to name the place Port Carolina.

POINT VINCENTE.*

This is a steep, rocky cliff, one hundred and twenty feet high, and rising rapidly towards the north to the western part of San Pedro Hill, where the latter is between twelve and thirteen hundred feet above the sea. The cliffs are white and red, red predominating. The stratification is contorted, and on the west face, in the bend, it is irregularly elliptical. The point rises with irregular cliffs to the eastward. Two hundred and fifty yards off this point lies a low black *rock* twenty-five feet in extent, *awash*, with kelp stretching beyond it to three hundred and fifty yards. About a third of a mile eastward of Point Vincente there is a small black pyramidal rock, estimated twenty-five feet high. It is close to the shore.

From Point Fermin to Point Vincente the course is north eighty-five degrees west (N. 85° W.) and the distance six and a quarter miles. The general trend of the bluff is straight, but broken by sharp cuts and jagged points, reaching two hundred feet elevation, while the side of the San Pedro Hill is marked by numerous sharp ravines. Off this line of bold cliffs the water is ten fathoms deep within two hundred yards to half a mile.

No dangers are known outside the kelp patches, which are shown in depths varying from three to ten fathoms. Kelp is found four miles west of Point Fermin, just west of the point, and it also stretches for one mile off shore three quarters of a mile northeast of Point Fermin.

Vessels can round Point Vincente on the outer edge of the kelp, there being ten fathoms within three hundred and fifty yards of the point. Directly off the point, as mentioned above, there is a rock awash, lying just within the edge of the kelp.

A depth of forty fathoms of water is found one-half a mile off the cliffs, one hundred fathoms within less than a mile, and two hundred fathoms at one and a quarter miles. The bottom is mostly green mud, or mud and sand, in the deep water; inside the forty-fathom line it is variable, with a sandy tendency.

From Point Vincente the bearings and distances to prominent objects are:

Point Fermin Light house	S. 87	E.	6¼ miles.
Southeast end Catalina Island	S. 26	E.	26¼ miles.
Isthmus Cove, on Catalina Island	S. 2	E.	18¼ miles.
West end Catalina Island	S. 17	W.	18¼ miles.
Point Dume	N. 66¼	W.	25½ miles.
Point Hueneme Light	N. 73	W.	47 miles.
East end Anacapa Island	N. 85¼	W.	50 miles.
Point Loma Light-house	S. 57½	E.	86¼ miles.

The magnetic variation was 14° 45′ east in 1885, and increases one and three-tenths minutes annually.

* Named by Vancouver in November, 1793, after Vincente Santa Maria, one of the friars of the Mission of Buenaventura. On his chart, however, it is erroneously engraved "Pt. Vinente."

SANTA MONICA BAY.*

From Point Vincente to Point Dume the course is north sixty seven degrees west, and t distance twenty-five and a half miles. The space inside this course is called Santa Monica B and the deepest part is abreast the Arroyo Santa Monica, which is ten miles north of the abo line.

General Hydrography of the Bay.—From Point Vincente the cliffs to the northwest trend nor thirty seven degrees west (N. 37° W.) for two and a quarter miles to the westernmost terminati of the ridge, which is called Rocky Point (described on page 47), and thence nearly north nort east (NNE.) for three miles to the long sand beach forming the eastern shore of Santa Mon Bay. The northern shore lies at the base of the high, rugged mountains of the Santa Mon range. The beach is only passable at low water. The whole force of the western swell breal heavily against these cliffs. The depth throughout the bay is quite irregular. Abreast of t arroyo and town of Santa Monica, a depth of forty fathoms is found four miles off shore, but o the beach, between La Ballona and the salt-pond, a submarine plateau, four miles wide, stretch out to the southwest for eight miles, with very uniformly decreasing depths, to forty fathom with gray sand, mud, and gravel. Westward of this plateau, and towards Point Dume, the dept increases rapidly to nearly three hundred fathoms, muddy bottom, and carrying two hundre fathoms within a mile south of the point. On the east of this plateau, and towards Point Vi cente, there is a remarkable *submarine valley*, only one mile wide, between the one hundred fatho curves, and carrying from two hundred and eighty fathoms, muddy bottom, to one hundre fathoms within one and one and a half miles of the beach, near the salt-works. The eastern sid of this valley is remarkably steep, dropping from forty to two hundred fathoms in three-eighths a mile. The western side is more sloping, but the slope from one hundred fathoms is very shar

At the head of this submarine valley, and one and a half miles off shore, the water is covere with petroleum which evidently comes from a *submarine well*, supposed to be located near the hea of this valley, and the oil carried west by the current. The extent of the surface indications is on and a half miles by three eighths of a mile, and the depths over which it is found range from thirty two to one hundred fathoms, the middle of the oiled surface being over seventy five fathoms. Th bottom is sand and green mud. This oil is not so great in quantity nor so rich as that of the Santa Barbara Channel, but is superior to that on other parts of the coast. To designate this subma rine valley for reference we have named it the Vincente Submarine Valley.

In executing the hydrography of Santa Monica Bay, a well marked current running to the northward and westward was always observed in the vicinity of Malaga Cove, and abreast the salt works.

Redondo Wharf.—A wharf has been constructed from the beach near the salt pond at the southeast part of Santa Monica Bay, and it stretches out towards the deep water at the head o the sub-marine valley. Thence a railroad was constructed to La Ballona. The strong westerl winds make a heavy swell squarely upon the beach, and in one of the heaviest blows the outer part of the wharf was damaged (1889).

Kelp in Santa Monica Bay.—From Point Vincente round to the termination of the rocky bluf at Malaga Cove (described on page 47) the shore is bordered by a heavy field of kelp, which lies from one quarter to nearly three quarters of a mile off shore; and the outside edge is generally in ten fathoms of water.

No *dangers* have been discovered in this kelp, except a *sunken rock* one eighth of a mile off Re sort Point, which is one-third of a mile southeast from Rocky Point.

Commencing about three quarters of a mile west of Santa Monica wharf (now going into decay the kelp lies in a compact line for three miles along the shore further to the westward, and stretch ing out to four and five fathoms of water at one third of a mile from the shore.

Kelp is also found northeast of Point Dume, on both sides of Dume Cove, and reaches out to ten fathoms of water, except immediately at that anchorage, where it is quite close inshore.

Around the shores of Santa Monica Bay from Malaga Cove to two miles west of Santa Monica, and abreast the high mountains, the line of ten fathoms is found one mile off shore; thence to Point

*On the Coast Survey charts of 1853 this bay is called Bahia Ona, which is undoubtedly a corruption of La Ballona the name given to the rancho bordering the beach south of Santa Monica, and to the laguna inside. The rancho is said to have derived this name from the dead whales occasionally drifted ashore here by the strong westerly winds Vizcaino's chart (Sutil y Mexicana) designates this bay as a "Gran Ensenada."

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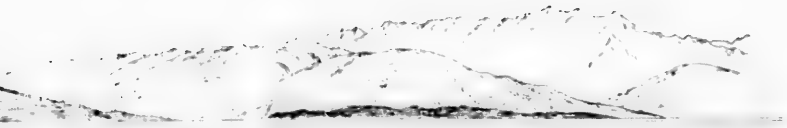
Lion's Head, 2,500 feet
Point Dume, NW ¼ N., 8 miles.

Dume Cove,
Santa Monica Bay



Keller's Shelter, Santa Monica Bay, N. by E., 10 miles.

Dume Cove,
Santa Monica Bay

Castro Peak, 3,046 feet.

Dume the line of thirty fathoms is about one mile off shore. The course of the coast steamers lies just outside the limit of Santa Monica Bay, being a straight line from Point Vincente to Point Hueneme. On this course, under favorable atmospheric conditions, the highest four electric lights of Los Angeles are sometimes visible, and of course are much oftener seen when a vessel is well in the bay.

A new land-mark at Santa Monica is the "Arcade," which is built on the face of the cliff on the northwest side of the Arroyo Santa Monica and rear the head of the present wharf. To the water it presents a front seventy-five feet high and two hundred and sixty-six feet long, and is surmounted by a high tower and belvedere. It is easily seen by the steamers on their usual course from Point Vincente to Point Hueneme.

Santa Monica Wind gap.—The westerly winds blow quite strong over this bay, and in March, 1872, we experienced a very severe northwester, which cut away parts of the beach between Santa Monica and Point Dume ten feet in depth. The low land between San Pedro Hill and the Santa Monica Mountains affords a good wind gap for the cool winds to draw over the Los Angeles plains towards the hotter regions of San Bernardino and the Mojave and Colorado deserts. In the season of fogs they first cover the bay and the shores in the afternoon, and are mostly dissipated during the next morning.

The Shores and Anchorages of Santa Monica Bay.—From Point Vincente, which is the southeastern limit of Santa Monica Bay, the cliffs trend north thirty-seven degrees west (N. 37° W.) for a little more than two miles, to Rocky Point.

Rocky Point.—This is a high, bold point, rising rapidly from a bluff of one hundred and twenty feet to the western extremity of San Pedro Hill. The old sea-benches, especially those of three hundred, six hundred, one thousand, and twelve hundred feet elevation above the sea, are very marked on the slope of the hill back of this point. Kelp stretches out half a mile from the point to fifteen fathoms of water. The whole force of the western swell breaks heavily against the cliffs from Point Vincente to Rocky Point, and hence to Malaga Cove.

Malaga Cove.—From Rocky Point the bold shore runs two and five eighths miles nearly northnortheast, to Malga Cove, where the character of the coast-line changes from high bluffs to rolling, grassy ridges and sandy beach. At this bend of the shore the main mass of the kelp stretches out more than half a mile, with a decided break in the mass leading to the anchorage. It is a good shelter for winds from the north, east, and south, but it affords no protection from the swell which heaves directly in from the west. Vessels must be prepared to go to sea so soon as the wind hauls to the westward. In seeking this anchorage, run for the north end of the bluff and pass through the fair-way in the kelp to six or seven fathoms, over gray sand, with Rocky Point two and a half miles distant, bearing south by west (S. by W.). Small vessels may go in closer and anchor inside the kelp in four fathoms, over gray sand. There is no good boat-landing here, and no wood nor water.

From Malaga Cove the high cliffs change to long, rolling sand dunes about one hundred feet in height and parallel to the straight, smooth sand beach. Inside of these dunes are grassy ridges, reaching two hundred and forty feet elevation, and beyond are broad depressed plains. Six and one-quarter miles north of Point Vincente and behind the first low ridge of sand dunes lies the small *salt pond*, where salt is manufactured in considerable quantities and transported fifteen miles to Los Angeles. At the time of the survey it was eight feet below the level of high water, and the water has a much greater specific gravity than the sea-water. It is of limited extent, being four hundred yards long by one hundred and fifty wide, and in ordinary years the product is two hundred and fifty tons; in favorable seasons it has risen to five hundred tons.

The Port of La Ballona.—The dunes and hills on the east side of Santa Monica Bay continue northwestward seven or eight miles to about fifteen miles north twenty-two degrees west (N. 22° W.) from Point Vincente, where there is a noticeable high sand dune on the southern border of a large lagoon called La Ballona, which has its outlet near there, and off which there formerly (1871) lay a lighter by which asphaltum was shipped. The "mesa," or table-land, lies inside these dunes, and when seen from the westward shows very distinctly, while the northern edge ends very abruptly near the lagoon. Between the lagoon and the ocean is a narrow sand-spit two miles long, running to the northwestward, continuous with the general direction of the shore. At the southern end of this sand-spit the waters of the Ballona Creek formerly emptied. A new port is being constructed at this Ballona Lagoon, and an artificial entrance has been made perpendicular to the beach in place of the mouth of the creek. Behind this sand-spit is the harbor proposed

to be dredged out, and the ships are to discharge and to load alongside of wharves, on wh railroad is laid hence to Los Angeles.

The low shore along the front of this lagoon extends nearly two and a half miles to the westward, with the ground rising gently from the lagoon, but facing the ocean, with steep hence one and a half miles to the arroyo Santa Monica, where the mesa is eighty five fe The arroyo has a narrow opening upon the sea beach, and here we found no less than fi tinctly marked old sea levels.

Santa Monica is a small village on the table land, fifteen miles from Point Vincente, at terminus of the Los Angeles and Independence Railroad hence to Los Angeles. There was five hundred and seventy-five feet long projecting directly from the face of the bluff into four feet of water, but it is reported as being now wholly neglected. The steamers no long this as a way port.

Tides at Santa Monica.—The Corrected Establishment, or mean interval between the time moon's transit and the time of high water, is IX 28 . The mean rise and fall of the tides is fo nine-tenths feet, of spring tides eight feet, and of neap tides two and two tenths feet. The duration of the flood is 5 02^m, and of the ebb 7 07^m, and of the stand 0^h 39^m. The average ence of the higher high and lower low waters of the same day was six and four-tenths feet, a greatest nine feet.

To find the times and heights of high and low waters, apply the following corrections times and heights for San Diego published each year by the Coast and Geodetic Survey: For of high water, subtract eleven minutes; for low water, add six minutes. For height of high add one and two-tenths feet; for low water, add one and four-tenths feet.

From the Arroyo Santa Monica to Point Dume the coast runs south sixty nine degre (S. 69° W.) for fourteen miles. Westward of the arroyo the table land narrows very rapid in less than two miles the high mountains of the Sierra Santa Monica, which reach two th five hundred feet elevation, come directly upon the ocean, so that at several points no beach The whole bold front of this stretch of coast line is marked by high bluffs and deep arroyos cut through them. At one place along the shore we found a rocky projection on the low wat of the beach composed of well marked columnar basalt.

Keller's Shelter.—This anchorage lies on the east side of Malaga Point, the only low p the above-described bold coast line, nine miles westward along shore from Santa Monica and seven miles eastwardly from Point Dume. The depth of water off shore increases to twenty fathoms, over mud and gravel, one mile outside the point.

The locality of this anchorage is recognized by the well marked reef of rocks stretch shore at a point half a mile to the westward of the anchorage. When far enough off shore to the interior range of mountains in view over those of the immediate coast line, bring Saddle M ain to bear north half east (N. ½ E.) and steer for it. This course leads to about a quarter of east of the anchorage. During the prevalence of westerly winds it is advisable when appro this anchorage to keep somewhat to the eastward in order to approach and select a berth w ship's head to the westward. Run in until the southwestern point of the anchorage bear southwest (WSW.) about one quarter of a mile distant, and anchor in five to seven fathoms fine gray sand. There is good boat-landing and wood and water at all seasons.

Saddle Mountain is the easternmost peak of a lofty and well-defined saddle in the mountain range.

Dume Cove.—This indentation of the shore line of the Santa Monica Bay lies two miles east by north (NE. by N.) from Point Dume.

During a very heavy blow from the northwest in March, 1871, we were convinced that of importance as a harbor of refuge for vessels in heavy northwest weather. There was water in the cove, the wind blew fiercely off shore over the neck of Point Dume, and small could lie without danger or discomfort. It is good for all winds from southwest, west, nor northeast. It was frequently used by the coast surveying schooner *Humboldt* in 1856, and r upon favorably, and that a depth of five fathoms could be carried close inshore. It has no o dangers, and there is very little kelp at the anchorage, but the kelp should be avoided les pected rocks may exist among it.

Between the point and the anchorage the shore is mostly white cliffs of one hundred and t feet elevation, broken by sharp arroyos. The anchorage is abreast the fourth and widest inside the point, and in this arroyo a small house (unpainted) was visible from the water

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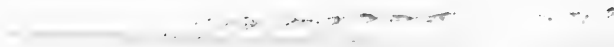
Point Mugu, W. by N. ¼ N., 36¼ miles.

Santa Monica Mountains, heigh



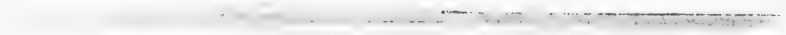
Point Mugu, WNW., 26 miles.

Point Dume, east 17 miles

Santa Monica Mountains, height 3,300 feet.

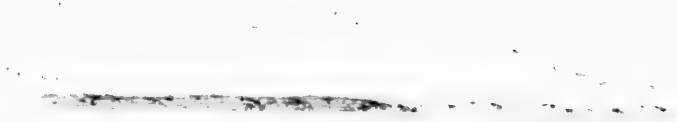
Santa Monica Mountains, 3,300 feet
Point Dume, NW ¼ W., 12 miles.

Point Dume, E. ¼ N., 12 miles. Santiago Mountain 5,685 feet, [illegible]



San Pedro Hill, as an island, 1,475 feet, 39 miles

Santa Monica, NE. ¼ N., 15¼ miles.



Mount San Antonio, San Gabriel Range, NE. by E. ½ E., 32 miles, 9,935 feet

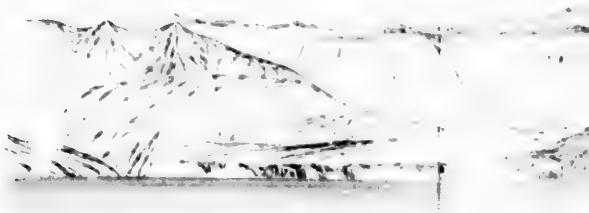
Zuma V

Point Mugu, WNW., 19 m

Zuma Valley.

Point Dume, NW. by N., 7 miles.

NW., 19 n



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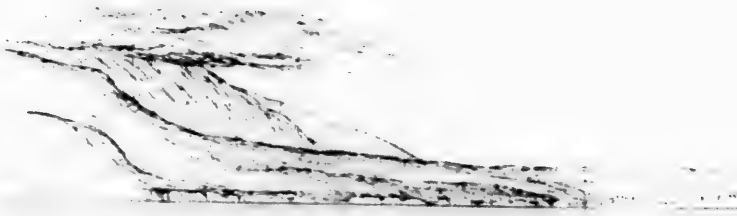

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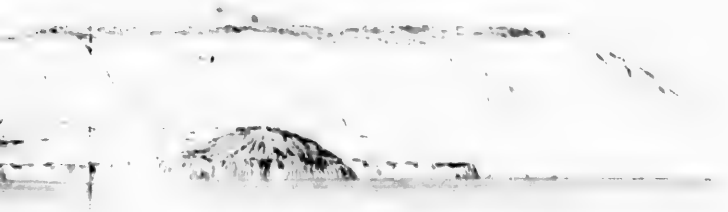

Point Dume, 202 feet,
NE. by N. ¼ N., 8 miles.

Dume Cove.

Point Dume, 202 feet, E. ¼ N., 7 miles.

Point Dume, 202 feet, E. by N. ¼ N., 7¼ miles.

cañon is also marked as having trees in it. There are no sand dunes to the west of it, but sand dunes under white cliffs lie a mile to the eastward. Half way between the cove and the point, the kelp stretches out nearly three-quarters of a mile to the eastward, decreases to the anchorage, and then stretches as a narrow belt one and a half miles to the northeastward. The anchorage is in five or six fathoms, good holding ground of fine gray sand, with the clump of trees in the cañon bearing north northwest (NNW.) and Point Dume bearing southwest (SW.). Boat-landing may be chosen at discretion between the anchorage and the point.

There has been no detailed hydrographic survey yet made of it, but for some years it has been used by vessels that have experienced its advantages and thus obviated the necessity of running for San Pedro, about thirty three miles to leeward, under stress of northwest weather. It is reported that on the inner side of the kelp towards Point Dume there are sunken rocks, but none in the cove.

Point Dume.—This point rises from a bold, rocky bluff to a dome like head two hundred and two feet above the sea, while the land immediately behind it falls away so that in making it from the westward it rises into view as an island close under the high mountains of Santa Monica. From the low neck the table-land increases in height very gradually for about two miles, then rises sharply to an elevation of two hundred and fifty feet. The appearance of the head is very much like that of the head of Point Concepcion. Approached directly from seaward, the head may not be readily distinguished, because it is projected on the mountain behind it; but it presents a dark reddish bluff, with a short line (about a mile long) of low, broken, white cliffs, with sand dunes under them, to the westward, and further west the bluffs are green. To the eastward there are bright, white cliffs for two miles, to Dume Cove, and then white cliffs, with sand dunes under them, for the same distance. Further to the eastward the bluffs are green. In 1871 it was marked by a large signal-pole with a bushy top, denoting the position of the Coast Survey station, which is in

Latitude	34	00′	05.4 north.
Longitude	118s	48s	21.7 west
Or, in time	7h	55m	13s.4

The computed magnetic variation for January, 1885, is 14° 55′ east, and it increases 1′.3 annually.

From Point Dume we have the following bearings and distances to important points:

To Point Vincente	S. 67°	E.	25½ miles.
To anchorage off Santa Monica	N. 75°	E.	25 miles.
To east point of Anacapa Island	S. 75	W.	28 miles.
To Point Mugu	N. 85	W.	14 miles.
To Point Hueneme Light (not intervisible)	N. 83	W.	22 miles.

THE SIERRA SANTA MONICA.

This mountain chain lies in a general east-northeast and west-southwest direction from a point a little north of Los Angeles and terminates on the ocean at Point Mugu, but re-appears as the Islands of Anacapa, Santa Cruz, Santa Rosa, and San Miguel. It forms the north and northwest barrier of the coast of Santa Monica Bay and the channel. It is a bold, ragged range, with rocky masses tilted up in all sorts of shapes, giving a wild, irregular crest-line, averaging over two thousand feet elevation, and visible far to seaward. There is but one pass through it west of the Cahuanga Pass, near Los Angeles. The spurs from this forbidding mass make out at right angles to the backbone. These are smooth, at first nearly level, and then slope sharply towards the ocean, where they break off in precipitous cliffs. Between these spurs are deep, narrow, dark gorges and cañadas.

Point Mugu.—From Point Dume to Point Mugu the bearing is west seven degrees north (W. 7° N.) and the distance fourteen miles. Point Mugu is the sea-coast termination of the western part of the Sierra Santa Monica, and quite prominent, because the broad, low valley of the Santa Clara River lies to the westward of it. The hills above it rise to one thousand feet in about one mile, whilst the coast from Point Dume to Point Mugu is bold and high, reaching about two thousand feet above the sea and cut by dark cañadas. Two miles east of Point Mugu is the highest sand dune on the lower coast; it is about sixty feet above the sea and at the face of a very high bluff. It can be made out in clear moonlight nights. At the shore-line, Point Mugu is an irregular mass of metamorphic sandstone in strata inclining to the west-northwest, with an estimated dip of thirty-five degrees. There is a broad, dark stratum just above the lower and wider

stratum of lead-colored rock. In a fog a vessel close upon it might readily ascertain her posit by this peculiarity. From Point Mugu we have the following bearings and distances to impor points:

Point Dume	S. 85° E.	14 miles.
Point Hueneme Light over Middle Point	N. 7° W.	8¼ miles.
East end of Anacapa Island	S. 60° W.	15½ miles.

Santa Monica Bay was discovered by Cabrillo on the 8th of October, 1542, after leaving S Catalina Island. Ferrelo says: "This bay is a good port, and the country is good, with many va and plains and trees." He coasted along it part of two days, and named it the Bahia de los Fu "on account of the numerous smokes which they saw" on shore. Upon leaving it he refers as Puerto de los Fuertos.

On the 9th of October, 1542, Cabrillo anchored in the large inlet under Point Mugu, accor to Ferrelo's account. In his narrative he gives the word "Muga" as the Indian name of a va between San Buenaventura and Santa Barbara. The Spanish "Muga," however, very describes the point.

On the chart of Vizcaino it is the Gran Ensenada.

From Point Mugu to San Buenaventura, distant seventeen miles, the coast has a general northwest by north (NW. by N.), but midway it has curved two and a half miles to the south ward of this course towards Anacapa Island, thus contracting the eastern entrance or throa the Santa Barbara Channel to a width of ten and a half miles between Point Hueneme and east end of Anacapa Island. This short stretch of coast is low, flat, and sandy, being the ope of the extensive valley of Santa Clara, through which flows the Santa Clara River. This riv sometimes nearly dry during the summer, and terminates in lagoons and marshes; but in the r season a volume of water is brought down, having sufficient force to break through the na sand beach and flow into the ocean. On the head-waters of the Santa Clara and the Arroyo extensive petroleum wells have been opened.

Soundings off Point Dume and Point Mugu.—The water is very bold along the line of from Point Dume towards the Santa Barbara Channel, the twenty fathom curve averagin mile off shore and the forty fathom two miles off shore, except at Point Dume, where the proach nearer to the cliffs. For a distance of nine miles westward from Point Dume the of equal depth run very regularly, but trending further off shore towards Point Mugu. The dred fathom curve is reached within one and one quarter miles off Point Dume, and nine west of Dume it is four miles off shore. The four hundred-fathom curve, however, runs pa with the shore within these limits and at a distance of five miles from it, showing the bott have a more gradual slope off Point Dume and to become steeper as Point Mugu is approac whilst a depth of five hundred fathoms is not obtained until a distance of fifteen miles off sh reached.

Beyond these limits, or beginning at a point four miles to the eastward of Point Mugu thence to the eastern limit of the Santa Barbara Channel, the bottom becomes very irregula several submarine valleys of great depths have been traced close up to the shore line. Five southeast from Point Mugu there is a detached bank with forty-seven fathoms of water over and broken shells, having an area of two square miles within the fifty fathom curve. The increases rapidly to four hundred fathoms within one mile to the southward, and between the shore there is a depth from sixty to one hundred fathoms.

Laguna Point and Middle Point.—Immediately west of Point Mugu a low, narrow sand runs for a mile and a quarter close under the base of the rocky curve, and only five hundred from it, to the narrow mouth of the moderately large, irregular shoal Mugu Laguna, which miles long and lies just inside the sand beach. West of the narrow entrance, 350 sand-spo times another mile and a quarter and then widens, with sand dunes on the seaward side marsh on the inner side. The eastern bend of this widening is called *Laguna Point*, two west from Point Mugu. At this widening, the beach pushes outward over half a mile for tw a half miles, forming a low, rounding curve called *Middle Point*, three and a half miles w Point Mugu. Steamers pass quite close along this shore as they find five fathoms half a from the beach and ten fathoms at a mile.

From Middle Point the Point Hueneme Light bears north seventy-one degrees west (N. 71° distant four and three quarters miles.

On a recent map of California there is located a town called Port Wardell at this point, no such port exists.

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ardell at this point,

Laguna Point, NW. ¾ N., 4¼ miles.

Point Mugu, NW. by N. ¼ N., 3 miles.

La Joya Peak, 1,562 feet

Bright Cli

Sand head

Point Hueneme Light-house. NW. by W. ¼ W. 10¼ miles.

Towards Gaviota Mountain, 65 miles.

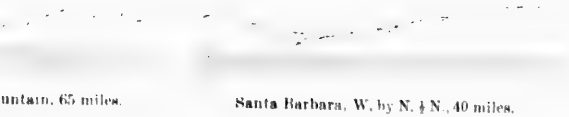
Conejo Peak, 3,311 feet high.

Sand dunes of Middle P

Bright Cliffs, Sycamore Cañon.

High sand dunes.

Point Laguna.



untain, 65 miles.

Santa Barbara, W. by N. ½ N., 40 miles.

nd dunes of Middle P

Point Mugu, E. ½ S., 3 miles

The Mugu Submarine Valley.—Two miles to the westward of Point Mugu, in the small sandy bight north and east of Point Laguna, and one and a quarter miles west of the entrance to the Mugu Laguna, is the head of a deep, narrow *submarine valley*, with a depth of twenty four fathoms one-third of a mile from the beach. A depth of two hundred fathoms is found within one and a quarter miles of the beach, and the width between the two hundred fathom curves is less than one-quarter of a mile. This submarine valley runs east-southeast nearly parallel with the shore for one mile, then turns sharply to the southward, and the width gradually increases to one and a half miles three miles from shore, directly south of Point Mugu. The other curves conform generally to the shape of the two hundred-fathom curve. The fifty fathom curve is distant but two thirds of a mile from the beach at the head of the submarine valley, and on either side of it runs out one and a half to two miles further. The sides of the valley are very steep. No difference in the character of the bottom from the surrounding plateau has been developed, all the specimens consisting of mud and sand.

Laguna Anchorage.—The head of the submarine valley between Point Mugu and Laguna Point swings in behind, or to the north of, a moderately shoal patch of limited extent making out perhaps three quarters of a mile east-southeast (ESE.) from Laguna Point. On this patch the coast steamers report excellent shelter in heavy northwest winds when they cannot lie at Hueneme. They anchor in from six to thirteen fathoms, but it is not easy to pick up the anchorage, because there is deeper water between it and the beach to the west-northwest (WNW.) of it.

The reason of this quiet spot is that a second submarine valley heads in towards Middle Point, which is one and one-half miles to the west.

The Middle Point Submarine Valley.—One mile south of Middle Point is the head of another submarine valley, where the twenty, fifty, one hundred, and two hundred-fathom curves run in squarely towards the shore about one and a half miles further than the general depths, with an average width of three-quarters of a mile between the one hundred-fathom curves. The forty-fathom curve is only a mile from the beach. This submarine valley gives smooth water to the laguna anchorage under Point Laguna.

POINT HUENEME.*

This point lies north seventy-four degrees west (N. 74° W.) forty-seven miles from Point Vincente and eight and a quarter miles west by north (W. by N.) from Point Mugu. With Anacapa Island it forms the eastern entrance to the Santa Barbara Channel, described page 53. It is long, rounding, low, and sandy, and is the most projecting point in the sweep of the lowlands of the Santa Clara Valley. Having no high background of hills it is in striking contrast with the other parts of the channel, so that in hazy or thick weather vessels must be careful not to approach it very closely until a steam-whistle is added to the light house. At present it is recognized in favorable weather by the light house and by the large warehouses and dwellings adjacent to the wharf, and also by large masses of trees planted among the dwellings. There are (December, 1884) three large warehouses on the beach abreast the wharf.

The best landing on the beach is directly on the point; in the bight to the eastward and leeward it is impracticable, but the wharf, now standing seven hundred and sixty five yards to the eastward of the point, affords good landing facilities. This wharf is two hundred and eighty yards long, fourteen feet above high water, and is built out from a piece of fast land between two marshes. For two hundred and fifty yards it extends square out from the shore, then from an elbow it runs thirty yards further, trending to the southwestward, and having twenty-three feet of water at its extremity. This elbow was built to enable vessels to lie more comfortably at the wharf, as a local eddy current was found running to the eastward from Point Hueneme, but more especially because the swell would strike the wharf fairly on end. Vessels lie on the southeast side so as not to chafe on the wharf, and when a heavy swell comes up they haul out to one or other of the four heavy mooring buoys.

The sand dunes west of the point form a very dreary shore-line that is white and inconspicuous in a fog. We have experienced a large swell from the southwest on this beach when

*Sometimes spelled "Buenemne," and said to be the name of a great Indian chief formerly in this region. In 1813 he is reported to have influenced the Indians as far as the Gila to join him in a successful attack upon the Mission of San Buenaventura, when all the priests were massacred. It is doubtless an Indian name. Ferrelo (1542) says that the natives call the Christians Taquimine, whence Hueneme may possibly be derived; but it may not have referred to the discoverers. Cabrera Bueno (1734) names it *Punta de la Conversion*.

there was very little surf at the wharf. A light northeast air sometimes draws out of the v... over the sea and keeps the fog out.

Near the head of the wharf there is an artesian well one hundred and fifty feet deep throws a stream of seven and a half inches in diameter twenty four feet above the surface. ... lumber and manufactured goods are landed here, and a great deal of produce is shipped schooners and coasting steamers. In 1880 the population was 186, with about forty house it is growing rapidly.

LIGHT-HOUSE AT POINT HUENEME.

The buildings are erected on a slight elevation, only eight or ten feet above the sea-level, near the extremity of the low sand point, with marshes behind it. The tower rises from wooden house, which is painted a light buff, and from seaward shows very well when proje on the hazy background of the distant hills. The light was first exhibited in 1874, and from sunset to sunrise. It is a sea coast light of the fourth order of the system of Fresnel shows a *fixed red light*. It illuminates the entire horizon, and the focal plane is elevated fifty feet above the mean level of the sea, so that in favorable conditions of the atmosphere it s... be visible from a height of –

[illegible]

The geographical position, as determined by the Coast and Geodetic Survey, is—

Latitude	34	08	30.1	north.
Longitude	119	12	33.1	west
Or, in time	7	56	50.2	

The computed magnetic variation is 14° 55' east for January, 1885, with a yearly in... of 1'.3.

From this light we have the following bearings and distances of prominent objects:

Point Mugu, over Middle Point and Point Laguna	S. 78°	E.	... miles
Point Vincente	S. 74°	E.	47 ...
East end of Anacapa Island	S. 29°	W.	14 miles
Point Cavern, Northwest Point, Santa Cruz Island	S. 59°	W.	18... miles.
[illegible]	N. 48°	W.	9 ...
Santa Barbara Lighthouse	N. 75°	W.	30 miles
Point Conception Light house	N. 87½°	W.	68... miles

Tides.—At Point Hueneme the average time of high water after the moon's meridian p... is 9h 27m; the average rise of the tides above the mean of the lower low waters of each day and one-half feet; the greatest range observed in one day from June to December was eigh... one-half feet.

Vancouver says this point was called Point Conversion on old Spanish charts. He pl... in latitude 34° 09' and retained the name. On a recent map of California this name is appl... what we have described as Middle Point.

SUBMARINE VALLEYS, HUENEME.

Directly off Point Hueneme is found the most remarkable of these submarine valleys, the of which is so near the shore that a depth of ten fathoms is found within two hundred ar... yards of the beach. The plateau to the westward has a very regular slope, beginning at the ... of ten fathoms one and a quarter miles from the shore, and twenty fathoms at three and ... miles, then more rapidly to fifty fathoms at three and three quarters miles, and one h... fathoms at four and a half miles. The two-hundred fathom curve passes within one and ... miles southeast of Anacapa Island and runs straight up into this submarine valley, appro... to within three and a half miles of Point Hueneme. The one hundred fathom curve in the va... distant one and a third miles from the shore. The sides are very steep, the depth increasin... fifteen to one hundred fathoms in less than one quarter of a mile. The average width be... the one-hundred fathom curves is two thirds of a mile. To the eastward the curves of the p... are more irregular. The ten fathom curve is distant one and a quarter miles from shor... twenty-fathom curve is two and two thirds, the fifty fathom curve is four, the one-hundred f... curve is four and a half, and the two hundred fathom curve is five and a half miles from the ...

THE SANTA BARBARA CHANNEL.

This strait is sixty miles long by ten and a half to twenty miles wide, and lies between the main shore from Point Concepcion to Point Hueneme and the Santa Barbara Islands, which lie to the southward broad off the main land. The islands are extensive, bold, and high, with deep channels four or five miles wide between them. The chain lies west by south (W. by S.) and east by north (E. by N.) in a straight line for fifty-five miles, and really forms a prolongation of the Santa Monica range of mountains that stretch fifty miles eastward from Point Mugu to a little northward of Los Angeles, already described (page 49). Commencing at the west the islands are named San Miguel, Santa Rosa, Santa Cruz, and Anacapa. Between the first and Point Concepcion is the western entrance to the channel, twenty-three miles wide; and between the eastern end of Anacapa and Point Hueneme, forming the eastern entrance or throat of the channel, the width is only eleven miles. From east to west the increase in width is gradual and regular.

The islands break the force of the large westerly swell of the Pacific along the coast-line, and in winter afford good lee from the full force of the southeast gales.

The *eastern entrance to the Santa Barbara Channel* is marked by the great submarine valley off Point Hueneme, already described. This valley runs southward about seven miles to the three-hundred-fathom curve, six miles east of Anacapa. Westward of this valley the chart indicates a line of deep soundings through the axis of the channel, but nearer to the islands. Southwest of Point Hueneme the twenty-fathom line is less than four miles off shore, with a bottom of fine gray sand; thence the soundings increase more rapidly to one hundred fathoms in one mile, with muddy bottom. The deepest part of the eastern entrance to the channel, one hundred and thirty-eight fathoms, over mud, sand, gravel, etc., is five and a half or six miles from Point Hueneme. There is bold water round Anacapa—twenty fathoms within half a mile. Westward of Point Hueneme the twenty fathom curve is six miles southwest of San Buenaventura; the one-hundred-fathom curve at nine miles, and the greatest depth is one hundred and thirty-two fathoms, at six miles from the west end of Anacapa. The one-hundred-fathom curve keeps well over on the south side of the channel and lies within seven miles of the east end of Santa Cruz Island, and the southern one-hundred fathom curve is only two miles from the north shore of Santa Cruz. This south line of one hundred fathoms continues westward nearly parallel with the north shore of Santa Cruz Island, and is three and a half miles from it at the western extremity; but the northern line of one hundred fathoms retreats towards the Santa Barbara shore, and at Pelican Point is only three miles from it, whilst the depth in mid-channel has increased to three hundred and six fathoms, over dark-green mud. In this broad, deep channel there is a bank with less than one hundred fathoms ten miles south by east (S. by E.) from Santa Barbara.

Following the Santa Barbara shore westward from Pelican Point (now called Goleta Point on the recent chart of Santa Barbara Channel) to Point Concepcion, the one-hundred fathom curve keeps at a moderately uniform distance of four miles, over muddy bottom. South of Point Concepcion, the depth increases in eleven miles to two hundred and sixty fathoms over green mud and sand, then rapidly decreases to one hundred fathoms in a mile, having a moderately decreasing line of soundings to San Miguel Island and the rocks off it.

In the middle of the channel, thirteen miles north of Santa Rosa Island, there is a deep basin where the soundings reach three hundred and sixty-six fathoms, with a bottom of green mud.

Close under the northern shore from Point Hueneme to San Buenaventura there is a very uniform and gradual increase of the depth of water from the beach to ten fathoms, at one and a half to two miles off shore. From San Buenaventura to Santa Barbara, a depth of twelve fathoms is found one mile off the general trend of the shore, with remarkably uniform bottom, and continues so most of the way towards Point Concepcion, except in a few instances, which will be mentioned in the description of the kelp along the north shore of the channel.

Kelp in the Santa Barbara Channel.—There is no kelp along the low, sandy beach off the opening of the Santa Clara Valley, at the eastern entrance of the Santa Barbara Channel. A small patch lies in San Buenaventura anchorage, in five and a half fathoms. Two miles west-northwest of San Buenaventura River the shore begins to be bordered with broken fields of kelp, running out to four and six fathoms for three miles, to Point Las Pitas. About a mile west-northwest from Point Las Pitas a more compact body, nearly half a mile wide, stretches for four miles across Point Gorda towards Rincon Point. Thence for three miles the comparatively low shore-

line has no border of kelp until Sand Point and its shoal approaches are reached, where it str out to five and eight fathoms.

From Sand Point, nine miles east by north (E. by N.) from Santa Barbara Point, the kelp bordering the shore may be considered almost continuous for thirty-seven miles to Po cepcion, in some places its outer edge being fully a mile from shore in from six to nine fat water. Off the Santa Barbara Light house, however, the patches of kelp stretch out o hundred yards, with a depth of nine fathoms at their outer edges, and thence the depth in rapidly to twenty fathoms within two thirds of a mile. There is a great field of kelp in the hence to Goleta Point, its outer limit one mile off shore, in nine fathoms, but off Goleta itself it reaches out to the same depth at six hundred yards from the shore, and the dep falls suddenly, at eight hundred and fifty yards from the point, to twenty fathoms over gra and sand. Thence the kelp lies in from seven to nine fathoms as far as the reef lying eleve a half miles westward of Santa Barbara Light, or five and a half miles west of Goleta This reef is a rocky ledge of two hundred yards extent, with only fifteen feet of water It lies five eighths of a mile off shore, and there is a uniform depth of eight fathoms inside for one third of a mile, whence the water decreases regularly towards the bluff shore. Th consists of two heads, with a three fathom passage running north and south between them. is good water (ten fathoms) one hundred yards south of them. The kelp, which is quite along here, stretches beyond its usual regular line to embrace this ledge, and extends to a of eight fathoms beyond it.

Immediately west of this reef the direction of the outer edge of the kelp, which is othe generally parallel to the shore, changes to northwest, running in towards the shore, and i a break of a little more than a mile and a half in the continuous fringe of kelp along shor the middle of this break, however, lie three small patches of kelp. There is another bre nearly two miles at the Cañada del Refugio, twenty miles east from Point Concepcion, bey are patches of kelp in the gap. Four and a half miles east from Point Concepcion the field i a mile in width and has ten fathoms of water within it. The kelp ceases between Viejo Co the Coxo anchorage, where there is none; nor is there any off Point Concepcion.

The kelp off the islands on the south side of Santa Barbara Channel will be described the head of each separate island.

A fisherman of Santa Barbara reported in December, 1869, the existence of a nineteen f bank, with forty five fathoms all around it. His bearings for finding it were to bring the end of the wharf in range with the north tower of the Mission and the point of San Bue tura bearing east, which would be about four miles off shore, but the hydrographic survey fur no indication of the existence of such a bank, and a depth of forty five fathoms is not atta the above range until San Buenaventura Point bears east by north (E. by N.), which wo about seven miles off shore. He also reported the bank to be about four hundred and fift long by one hundred wide and running parallel with the shore, and that it has "great a coral upon it; some black, some red."

The currents through the Santa Barbara Channel are somewhat variable, and especially to the eastern entrance. They have not been particularly examined. Along the shore westw Hueneme the set of the shore current is to the westward, and its influence extends from four miles off shore. It runs at a maximum velocity of a mile and a half per hour, but pr does not average more than eight miles per day. Along the shore line at San Buenavent found the current under the shore running to the westward (1870). Further off the northern it is variable, but generally running to the eastward and southward. Among the islands a more southerly direction. When the in shore eddy current reaches Point Concepcion it flected to the southward, being doubtless influenced by the main off shore current from the westward.

Within the Santa Barbara Channel the *climate* is much milder than to the northwar section being protected by the bold range of the Sierra Concepcion or Santa Ynez Mountai

The *landmarks of the Santa Barbara Chan.* l are remarkably bold. The north shore Buenaventura westward is formed by the bases of the Sierra Concepcion, which attains an tion of three thousand eight hundred and twenty-three feet immediately behind Santa Ba the south shores are formed by the islands, which are as bold and well marked, but which d attain so great an elevation, rising to twenty two hundred feet, and visible fifty miles fro ward.

The peak of San Rafael, twenty one miles north twenty-nine degrees west (N. 29° W.) from Santa Barbara Light-house, attains an elevation of sixty-five hundred feet, and should be visible at a distance of ninety-five miles, or beyond the Santa Barbara Islands, and as far north as the Piedras Blancas.

SAILING DIRECTIONS.

The Santa Barbara Channel is used by all coasting steamers and vessels running between San Francisco and San Diego; the Panama and Mexican steamers now usually keep outside the islands, especially in running south.

Bound through the channel, vessels coming from the southward take their departure from Point Fermin Light, Point Vincente, or from Point Dume, then run to clear Hueneme, as it is considered dangerous to approach Anacapa Island on the further side of the channel.

Coming from the northwestward, vessels make Point Concepcion, and either in pleasant or in thick weather can keep close under it. Sailing vessels, however, should not keep it close aboard, lest they lose the wind under its lee. In thick, foggy weather, without wind, navigators, in making the Santa Barbara Channel from the northwest, are sometimes able to estimate their approach to it by the peculiar odor of the film of petroleum which spreads over a large part of the channel in warm, quiet weather. This oil rises from two or more submarine oil springs, one lying thirteen miles south of Santa Barbara, or eight miles to the northwest of Prisoner's Harbor, Santa Cruz Island, nearly in the middle of the channel. The largest oil spring is located about four miles west of Goleta Landing and about one mile from the shore, in twelve fathoms of water. At this place the surface of the water is covered with a sheet of oil about two inches thick and covering an extent of about five acres. All along the coast thence to Point Concepcion, and about the same distance from the shore, there are several springs, but much smaller in extent than the one described.

Vancouver is the first who calls attention to the bitumen and petroleum, in the following language (Vol. II, page 449):

> The surface of the sea, which was perfectly smooth and tranquil, was covered with a thick, slimy substance, which, when separated or disturbed by any little agitation, became very luminous, whilst the light breeze that came principally from the shore brought with it a strong smell of tar or of some such resinous substance. The next morning the sea had the appearance of dissolved tar floating upon its surface, which covered the ocean in all directions within the limits of our view, and indicated that in the neighborhood it was not subject to much agitation.

The following remarks of Sir Edward Belcher, in October, 1839, are taken from the Voyage of the *Sulphur* (Vol. I, page 320):

> Off this part of the coast to the westward [of Santa Barbara] we experienced a very extraordinary sensation, as if the ship was on fire, and after a very close investigation attributed it to a scent from the shore, it being more sensible on deck than below; and the land breeze confirming this, it occurred to me that it might arise from naphtha on the surface.

The smell of this asphaltum appears to be occasionally experienced quite far from the land. (See Coal-Oil Point.)

In working to the westward in the channel, with summer westerly winds, it is advisable to keep far enough out to get the force of the wind without the large swell. If compelled to work close under the north shore, advantage may be taken of the eddy current running to the westward. In winter the harbors on the north sides of the islands afford good shelter during heavy southeasters, or a vessel may lie to very comfortably under the lee of these high islands. In approaching the north shore vessels will find bold water, especially off the points, but it is hazardous to go inside the line of the kelp, which exists in large masses in many places.

During the summer seasons the *heavy fogs* are almost constant in the Santa Barbara Channel, and envelop the main shore, channel, and islands, but not unfrequently the islands alone are hidden, whilst the main-land and channel are clear or moderately clear. For the space of six weeks at Point Concepcion in 1850, with clear days and nights, the islands were invisible, but upon rising to an elevation of one thousand or fifteen hundred feet on the mountains the observer plainly saw the summits of the islands above the sea of fog enveloping them. Sometimes the islands will be clear all day, but wrapped in a dense, wet fog all night. The fogs mostly exist during calm weather and light winds, and are generally dissipated by the stormy northwest winds. Should they remain with a high wind the weather becomes uncomfortably cold.

The *winds in the Santa Barbara Channel* are wholly different during the summer from those outside the islands and off the coast to the northwestward. Under the north shore the westerly

winds do not reach far eastward of Point Concepcion with much strength, but are felt t
the islands, and we have been forced to leave the anchorage in Prisoner's Harbor by a stro
and heavy swell coming in from the channel. We have frequently seen vessels coming
the eastward with all sail set and light airs from the north, in a very little time reduced t
canvas on approaching the cape, and vessels from the northwest coming before a spanking
lose it within a few miles after passing the cape into the channel. These last would be fo
in reaching Santa Barbara in a day. We have known a vessel to be three days working fr
Buenaventura to Santa Barbara while a ten knot breeze was blowing west of Point Conc

Outside the islands there is in summer a prevalence of strong northwest winds with
swell, usually running with the off shore current, but at times there appears to be a current
the wind, as determined on the Cortes Shoal, and then the swell is shorter and necessari
"choppy."

In winter the southeast gales are not so fierce as further north. They generally last
three days, with moderate rain; and a cross sea and heavy swell are raised, because the
against the current. When the gale is about to break, the barometer, which seldom falls mo
half an inch, commences to rise, the wind veers to the southwest and west, and soon chan
the northwest, with clear weather and a rapidly falling sea.

The rainy season commences in the early part of November with slight showers and con
until the middle of March. The heaviest rains fall in December to January. The quan
rain that falls does not average over fifteen inches, but some seasons are marked by exc
drought. During the winter southeast gales prevail, and sometimes during the summer
southerly weather will bring up heavy rain. At Point Concepcion we had a heavy rain and
east wind in August.

The Channel of Santa Barbara was discovered by Cabrillo in 1542, and named "El C
Santa Barbara" by Vizcaino in December, 1602. A preliminary chart of the eastern en
was published many years since by the U. S. Coast Survey, but in 1882 a large-scale chart o
whole channel was published.

SAN BUENAVENTURA ANCHORAGE.

This is a slight indentation in the general trend of the coast, and affords a small, good
mer anchorage, but open to the southerly gales of winter. It is just within the throat
Santa Barbara Channel at its eastern entrance, and is eight miles north forty-five degrees
(N. 45° W.) from Point Hueneme Light, and sixteen miles north eight degrees west (N. 8
from the eastern extremity of Anacapa Island. It lies under the spur of the mountains,
attain an elevation of nearly three thousand feet, and come upon the coast between the
valley of the San Buenaventura River on the west and the broad valley of the Santa Clara
on the east.

Of San Buenaventura Cabrera Bueno (1734) says: "The land makes a bay with a clear
to the end of the bluff land."

The spur of these mountains and the town at their feet behind the anchorage afford
marks for making it. When abreast San Buenaventura the valley of the river of the same
is well opened, and the wharf off the bluff just east of the town is distinctly made out, espe
in the morning, with the shadow on the north side. The westernmost point forming the anch
is low and sandy, but the shore round to the eastward is bordered by a steep yellowish
rising from thirty to seventy-five feet in height, at two miles eastward, and forming the
termination of the broad plains of the Santa Clara Valley. There are no outlying dange
kelp, and the three fathom curve is about one third of a mile off shore. Vessels come
anchor in four or five fathoms with safety in summer weather; in winter they anchor
fathoms, with excellent holding ground, but must be ready to go to sea upon the appearan
approach of southeast weather.

The wharf stretches out three hundred and ten yards from high-water mark from unde
bluff in the deepest part of the bight forming the anchorage, and east of the town. The
three large warehouses on the bluff, at and near the inner end of the wharf. The depth of
at the outer end of the wharf is fifteen feet, and here the wharf is twenty feet above high
Moorings lie off the end of the wharf and also on the east side. All vessels load and disc
at the wharf. We head nearly north when lying along-side, and haul out to mooring buoys
four-inch oil pipe has been laid from Santa Paula, twelve miles from this place, to a large ta

the head of the wharf, from which it is brought down to the vessels to load in bulk. The landing on the beach is bad and in winter very frequently dangerous. The eddy current close along the shore sets to the westward.

Large quantities of grain, produce, and wool, petroleum, and a great number of cattle are shipped from this place, and a large extent of the adjacent country is supplied therefrom. The town had a population of thirteen hundred and seventy in 1880, and is rapidly increasing.

The river San Buenaventura comes through a narrow, but rich, agricultural valley on the west side of the town, but in dry seasons it is low and does not break through the beach. On the west side of the river are some fine examples of coast plateaux.

The low point at the mouth of the river is named *Point Buenaventura.*

From Buenaventura the island of Santa Barbara, distant fifty miles, has been seen above the horizon upon several occasions during the last fifteen years, although it is necessary to ascend to an elevation of four hundred feet to see it under ordinary conditions of refraction.

The Mission of San Buenaventura, now surrounded by the town, which has improved rapidly within a few years, was founded March 31, 1782, and is in a fair state of preservation. Its geographical position, as determined by the Coast and Geodetic Survey, is—

Latitude	34	16	50 .5	north.
ongitude	119	17	18 .0	west.
Or, in time	7h	57m	11s.2	

The computed magnetic variation is 15° 33′ *east* for January, 1885, and increases 1′.3 annually.

On the 10th of October, 1542, Cabrillo, according to the narrative of Ferrelo, anchored in front of a very large valley on the coast west of Mugu. It is highly probable this was at San Buenaventura, where there was an Indian village with large houses. To the ships came many canoes, each holding twelve to thirteen Indians, whence Cabrillo named it El Pueblo de las Canoas. The Indian name was Xucu.

The slight point at this place was named "Punta de Rio dulce" by Vizcaino (Sutil y Mexicana).

In 1769 the latitude of "the Indian village at the east end of the channel of Santa Barbara" was determined by Don Michael Constanzo, the engineer of Governor Gaspar Portala's expedition, as 34° 13′, very probably at the mouth of the San Buenaventura River.

In 1793 Vancouver's observations at his anchorage, three miles west half north (W. ½ N.) from the landing, reduced to the latter place, gave the latitude 34° 15′.

THE SIERRA CONCEPCION.

From San Buenaventura the mountain range forming the coast-line westward is named the Sierra Concepcion, although sometimes called the Sierra Santa Ynez, from the mission and stream of that name on its northern base. It rises abruptly from the water hence to Points Concepcion and Arguello, and is one of the best-defined mountain ranges on the coast. It extends nearly east and west for a distance of seventy-five miles, whilst its greatest breadth is hardly more than ten miles. As seen from seaward it forms a lofty barrier, attaining an elevation of three thousand eight hundred and twenty three feet immediately behind Santa Barbara, and decreasing to two thousand feet near the San Buenaventura River at the east and at Point Concepcion on the west. Throughout its length there is but one pass through the range, the Gaviota, seven hundred feet above the sea and twenty-four miles west of Santa Barbara. There is a steep pass over the range eight miles westward of Santa Barbara, but at an elevation of twenty-five hundred feet. One of the secondary axes of this Sierra terminates at Point Arguello, where the serpentine rock may be seen in large masses stretching into the sea.

The Sierra is almost parallel with the mountain chain running through the Santa Barbara Islands, San Miguel, Santa Rosa, Santa Cruz, and Anacapa, and the Santa Monica range, which is a continuation on the main land. It is very sparsely covered with timber, most of the range being destitute of trees, except for ten or twelve miles on each side of Santa Barbara. The small streams coming from the mountains from San Buenaventura River westward for about twelve or fifteen miles are so impregnated with alkali that they are too bitter to be used by man or animal, and no settlers were located along that stretch of shore for many years, but it is being gradually occupied.

Fifteen miles westward of San Buenaventura there is reported to be a rich deposit o on the shore, surface specimens yielding sixty per cent. Around the locality are found scoriæ; the ground is hot, and the gas emitted is almost suffocating.

Between San Buenaventura and Santa Barbara are four points, barely breaking th trend of the coast line and the two embarcaderos of El Rincon and the Carpinteria, wh uce is shipped to San Francisco.

Point Las Pitas.—This is the first bold point west of San Buenaventura River, being north seventy degrees west (N. 70° W.) from the mouth of San Buenaventura, at the mouth of It projects a little more than half a mile, and the extremity is low, but rises very quickl mountainous ridges within a mile. The shore on the eastern side falls back northeas three-quarters of a mile, with the three fathom line half a mile off the beach in this sp and some patches of kelp as far out as six fathoms; but there is no kelp off the immed and good water runs close to it. Kelp patches commence three-quarters of a mile to ward. On the west side of the point is a very steep arroyo.

The Coast Survey station on Point Las Pitas is in

Latitude	34° 24′ 8″.2	north.
Longitude	119° 37′ 22″.0	west (C
Origin	[illegible]	west

From Point Las Pitas to the Santa Barbara wharf the course is north eighty five de (N. 85° W.) and the distance fifteen and one half miles; to Santa Barbara Light, west W teen and one-third miles; and to Hueneme Light, south fifty-seven degrees east (S. 57° teen and three quarters miles.

Point Gorda.—Three and one half miles north sixty six degrees west (N. 66° W.) fr Las Pitas is another important point. It is low at its extremity, but backed by a very team, which rises in a little over one and one half miles to a culminating peak in the cr the mountains called Mount Hoar, which is twenty-two hundred feet in elevation. O side of the point a small stream comes down to the ocean. The kelp line lies close to with deep water. Santa Barbara wharf lies twelve and one-half miles west from this po designation of the point is a duplication of the name Punta Gorda, under Cape Mendo ought to be changed.

Rincon Point.—An unimportant point lying north eighty six degrees east (N. 86° E.) from the Santa Barbara wharf, and north eighty-two degrees east (N. 82° E.), twelve quarter miles from the Santa Barbara Light. It is a low, sandy point, through the which empties Rincon Creek. The low land rises to a bluff within two hundred yards, bluff is the southwest termination of a long ridge that runs east-northeast (ENE.) fou one-half miles to Mount Hoar, already described.

From El Rincon the low shore on the eastern side runs northeastwardly for one mile, and there is good anchorage, clear of kelp, in six fathoms, in this lee under the po it bears north sixty degrees west (N. 60° W.), distant seven hundred yards. Here th fathom line is only three hundred yards from the beach. Patches of kelp lie off the p there is none inside the three-and-one-half fathom line, which is between two hundred and three hundred yards off the beach. There is a depth of eleven fathoms one mile beach.

Westward of El Rincon the mountains retreat and the low land stretches more than the northward for three or four miles, and the shore line is low, with no kelp along the a couple of miles.

Cabrillo anchored under this point in October, 1542.

Sand Point.—This is a low and unimportant rounding of the coast-line, lying north one degrees west (N. 81° W.) from Rincon Point. It is seven and one half miles east by north (E. ¾ N.) from Santa Barbara wharf, and nine miles east by north (E. by N.) fro Barbara Light. It is low and sandy, and inside of it are the low sand flats cut up by the Carpinteria, which lies at the mouth of the arroyo of the same name. The estero empties narrow mouth opening to the eastward close under the point. Off the point a rocky reef s out a little over half a mile south fifty three degrees west (S. 53° W.), whilst to the south of the point the shoal water extends one third of a mile to the three-fathom line. The line is found as far out as six and a half fathoms, and the bottom is rocky and broken. The very broad and shelving, except half way between the point and Olmster, one mile ea

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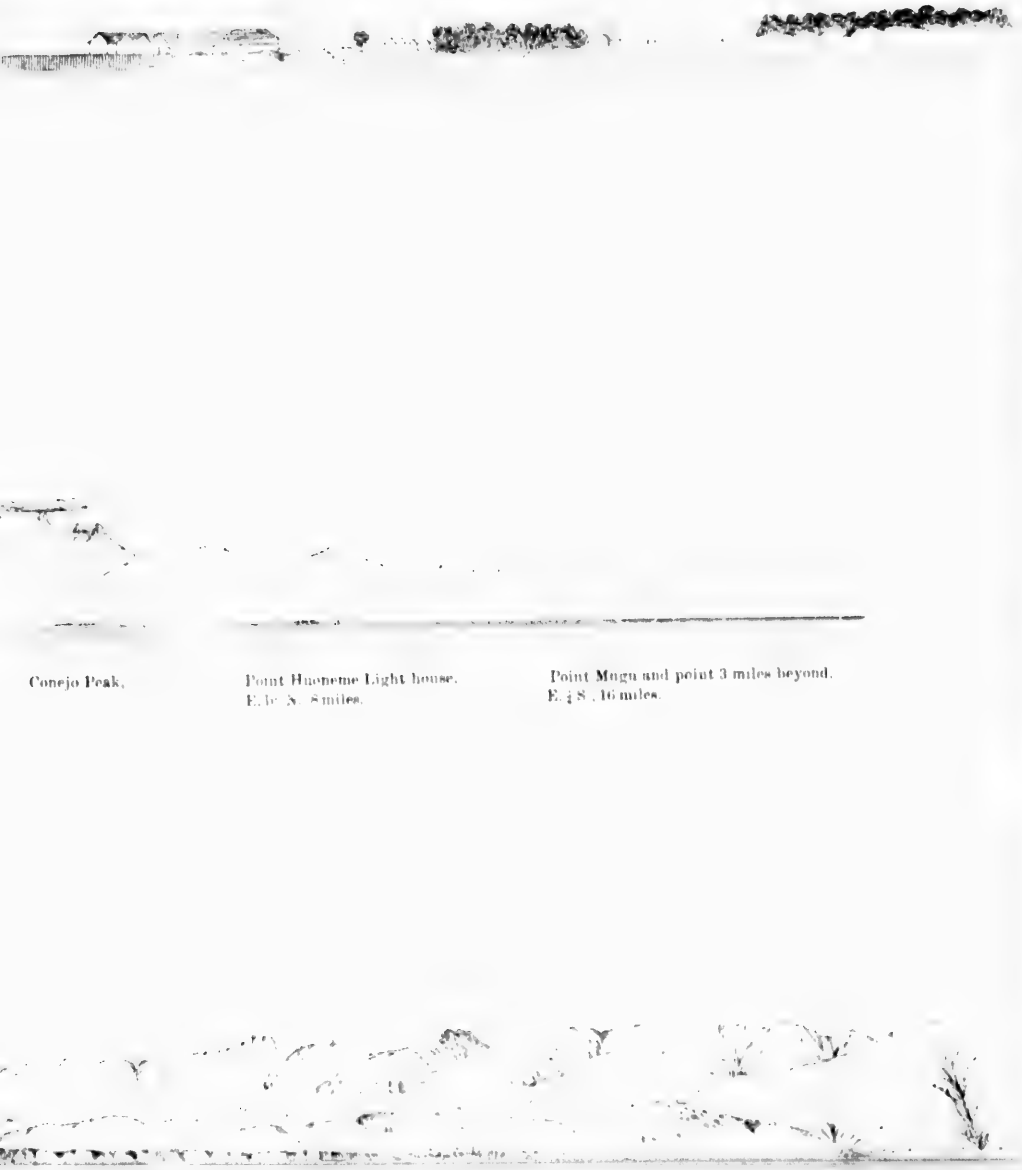
Point Hueneme Light-house,
NW. by W. ½ W., 4 miles
Conejo Peak.
Santa Barbara Light house


Conejo Peak,
Point Hueneme Light house.
E. by N. 8 miles.
Point Mugu and point 3 miles beyond.
E. ¼ S. 16 miles.
The Mission
Santa Barbara Anchorage, NW. ¼ N. distance to Point Santa Barbara,
nearly in range, 8 miles
Santa Ynez Mountain, 3358 feet.

where the three-fathom curve is two hundred and fifty yards from the beach. Moreover, in this vicinity the kelp is not so thick and the bottom is more regular. It is said that vessels coming from San Buenaventura in thick fog can go inside the outer field of kelp off this point and follow it to the Carpinteria Landing or Santa Barbara, but they must hug it closely to avoid the danger off Sand Point; but this seems a very dangerous direction when it is just as clear to follow the kelp on the outside and in better water.

One and a half miles eastward of Sand Point is a large deposit of asphaltum.

The *Carpinteria Landing* is in the bight east of the Arroyo del Toro, which opens through the bluff point two miles westwardly of Sand Point. It lies east sixteen degrees north (E. 16° N.) five and a half miles from Santa Barbara wharf, and east twenty one degrees north (E. 21° N.) seven and a half miles from Santa Barbara Light. The bluff on each side of the deep arroyo is nearly one hundred feet high and quite steep, with a flat country for half a mile to the north and northeast. The bight lying between this point and Sand Point is said to afford the best beach landing on this line of coast, and is clear of kelp for three quarters of a mile off shore, with very regular bottom from the beach to five fathoms at the kelp.

The wharf is nearly two thirds of a mile east northeast (ENE.) from the point, near the deepest part of the bight, where a depth of fourteen feet of water is found within two hundred yards of the beach. It is about eight hundred feet long and eight feet above high water. A depth of about twelve feet of water is found at ordinary low tide at its outer end, but the captains of the coasting steamers say this depth varies considerably with the season, as the sand washes off the beach in winter and shoals the water at the wharf. They report that this is characteristic of all the wharves projecting from a sand beach on the southern coast.

In approaching this landing from Santa Barbara in thick, foggy weather, coasting steamers may [illegible] under the shore side of the kelp, in three and a half to four and a half fathoms of water, until their distance is up, and then haul into the bight; but they can not follow inside the kelp near Sand Point on account of the rocky patches there.

Cabrillo anchored near Sand Point in October, 1542.

SANTA BARBARA.

From Point San Buenaventura to the wharf at Santa Barbara, the distance is twenty and two-thirds miles, and the bearing north eighty-two and one half degrees west (N. 82½ W.). In approaching Santa Barbara from the eastward or westward the elevation called La Vigia, or "Lookout Hill," on the west side of the anchorage, stands out well on account of the low land between it and the mountains to the north, and is a good mark before the light-house or the Mission is distinguished.

Vessels coming from the westward first sight this round, smooth-topped hill (which is four hundred and sixty-three feet high), and upon approaching the anchorage keep outside of the line of kelp field (here nearly half a mile wide) and gradually round the point, upon which is situated the *light-house*, two miles southwesterly from the wharf. Keep along the kelp until abreast of the town, and [illegible] seven fathoms, or pass through the kelp and anchor on the inside of the kelp field in three and a half fathoms, hard bottom; but the steamers now run directly to the new, or eastern, wharf, hereafter described. In anchoring far enough off to get nine or ten fathoms the bottom will be found rocky. A hydrographic sketch of the vicinity was published by the Coast Survey in 1855, and of the Santa Barbara Channel sheet in 1888.

No dangers have been discovered in the kelp off this beach.

In winter, vessels must anchor outside of the kelp, as the gales detach it and drive it shoreward in such vast quantities that, coming across a vessel's hawse, it helps to bring home her anchors. But it is not customary to ride out a gale, and upon the approach of a storm small vessels seek shelter under [illegible] Cruz Island, twenty miles distant to the southward, in the large bight known as Prisoner's Harbor, on the north side of the island.

The northeasternmost point of the Vigia Hill forms *Point Castillo*,* which is a nearly perpendicular cliff about fifty feet above the sea, and having a level strip of land behind it. The low

*It was named Point Felipe by Vancouver in November, 1793, after the commandant of the presidio of Santa Barbara, Señor Don Felipe Goycochea. It is named Point Castillo on the Coast Survey chart of 1853, from a small Mexican earth redoubt formerly existing upon it. The outline of the work could be traced in 1870. It is called Punta de Neve in the plan of Don Josef Tobar y Tamariz, 1786, as published by Dalrymple in 1789.

sandy beach commences at this point and stretches along about two miles to the northeast and the old wharf starts out from the beach about half a mile northeastward of the point. wharf is two hundred and eighty-nine yards long from the warehouse on the beach, and had feet of water at the extremity. A second wharf has been built to the eastward of this, prolongation of the main street of the town, and is four hundred and ninety yards long from water mark. It makes a turn about one hundred and twenty yards from the extremity, w elbow to the northeast. This part of the wharf is much wider than the shore end. The large warehouse at the extremity and another in the bend. The outer end of the wha twenty feet of water and one hundred and fifty yards from the inner edge of the field of which has four to four and a quarter fathoms along it. It bears N. 39° E. (north thirty nin grees east), distant one mile from Light house Point. In 1886 this wharf was extended hundred feet further, and this latter addition was bent still farther to the westward, thus m two elbows in the wharf. Its total length is now twenty-two hundred feet.

The landing was formerly on the beach at the position of the wharf, but with the westerly swell the surf is bad, not falling square on the beach, but cutting it at a sharp Close inshore the eddy-current runs to the westward against the prevailing, but light, west winds of summer. Passengers and freight are now landed at either of the two wharves t steamers and sailing vessels. Small vessels load and unload at the wharves, but are oblige haul off to mooring buoys when a heavy swell comes in. Lumber-laden vessels formerly their cargo to the beach at high water.

Santa Barbara Point.—The southeastern point of the Lookout Hill has no name, and yet the most marked in the immediate approaches to the anchorage. It is a high cliff at the outer edge of a narrow mesa under the southern slope of the hill, and is in fact the eastern limit of mesa upon which the light-house is situated. The field of kelp crowds close under it, where inner edge is in less than three fathoms and the outer edge in five fathoms one-third of a from shore. The ten-fathom line lies only half a mile, and the twenty-fathom less than a from the shore, bottom sand and soft green mud. In Tobar y Tamariz map of 1786 it is Punta de Martinez, but we have designated it Santa Barbara Point.

Santa Barbara Light-house.—Westward from Santa Barbara Point the narrow mesa Lookout Hill runs for nearly two miles, with a moderate swelling out towards the south. mile west-southwest (WSW.) from the point, and near the southernmost point of the be located the light-house, a little back from the edge of the cliffs. Abreast of it the field of begins to break and lies close under the cliffs, with six fathoms on its outer edge only one-qu of a mile off shore and ten fathoms at one-third of a mile, hard bottom. Outside of t fathoms, at a little over half a mile, the bottom is soft and sticky green mud. The forty-fa line is three miles off shore to the southward and westward.

There is a sharp depression just west of the light-house; and the bluff which runs a coup miles further to the westward is not so high, retreats to the northwest, and is cut by two or t sharp gullies.

The *light-house* structure consists of a plastered dwelling of one and a half stories, pa stone-color, with green shutters to the windows; a low, gray, round tower, also plastered, through the center of the roof of the building, with a circular balustrade, and the dome of the tern is painted red. The height of the center of the lantern above the base of the structu thirty-four feet. It is situated on the plateau one hundred and eighty-three yards from the of the bluff and under the southern slope of La Vigia, or Lookout Hill, two miles south fifty degrees west (S. 54° W.) from the end of the new wharf, but not intervisible, and one mile s seventy-two degrees west (S. 72° W.) from Santa Barbara Point. The buildings, as seen from ward, will be projected against the hill behind it. The illuminating apparatus is of the *fo order* of the system of Fresnel, and shows a *fixed white light*, illuminating the seaward half of horizon. The arc of visibility of the light, as cut off by the panels of the lantern, is from s eighty-six degrees west round by south to south eighty six degrees east, or a little less tha the horizon. The light was first exhibited December 1, 1856, as a red light, but has since changed to a white one. The height of the center of the lantern above the base of the stru is thirty-four feet; the focal plane is one hundred and eighty-three feet above the mean lev the sea, and in clear weather the light can be seen from a height of—

10 feet at a distance of 19 miles.
20 feet at a distance of 20¼ miles.

The geographical position of the light-house, as determined by the Coast and Geodetic Survey, is:

Latitude	34°	23′	49″.7 north.
Longitude	119°	43′	14″.6 west.
Or, in time	7h	58m	53s.6

The computed magnetic variation is 14° 57′ east for January 1, 1885, with a yearly increase of 1′.2.

From the Santa Barbara Light we have the following bearings and distances to important objects:

Point Hueneme Light-house	S. 75 E.	distant 30 miles.
East end Anacapa Island	S. 54 E.	distant 20¼ miles.
Prisoner's Harbor	S. 21 E.	distant 22¼ miles.
Northwest anchorage, Becher Bay, Santa Rosa Island	S. 19 W.	distant 28¼ miles.
Prince Island, Cuyler's Harbor, San Miguel Island	S. 11½ W.	distant 36½ miles.
Point Concepcion Light-house	S. 80 W.	distant 37¾ miles.

The secondary astronomical station of the Coast and Geodetic Survey was on the slight rise just up from the high-water line at the Santa Barbara beach, and thirty-one yards south-southwest (3SW.) from the inner end of the first wharf (1871). Its geographical position is:

Latitude	34°	24′	39″.1 north.
Longitude	119°	41′	22″.1 west.
Or, in time	7h	58m	45s.5

Electric Lights.—The establishment of the electric-light system at Santa Barbara makes it visible far to the eastward, and when a vessel is approaching the wharf the effect is brilliant but rather bewildering. Coming from the westward a vessel sees the illuminated atmosphere above the town projected on the dark mountains, the lights themselves being invisible; and when rounding Santa Barbara Point the effect is dazzling, as the lights burst upon the eye with suddenness.

Tides at Santa Barbara.—The average time of high water after the moon's meridian passage is 1h 21m, and the rise of tides above the average lower low water of each day is four and one-half feet. To find the times and heights of the high and low waters of each day, first obtain from the tables of prediction the times and heights for San Diego, and then add thirty-four minutes for the time of high water and subtract three-tenths of a foot for its height; for low water, add seven minutes, and for the height add one-tenth of a foot.

Santa Barbara is a town of considerable size and is growing rapidly. It lies in the middle of an agricultural tract of limited breadth, running east and west, at the southern base of the Sierra Concepcion. The climate is delightful. The cold, westerly winds rarely reach this far with any force, and, as the town lies in a low valley between the mountains and La Vigia, it is moderately well protected from the cold fogs of summer. The average temperature of the year is about 60° Fahr.; the average rain fall is about fifteen inches. The ground from the wharves to the town, nearly one mile distant, is low and flat, but gradually rises to the *Mission*, which is a very prominent object, about two miles from the shore, and three hundred and six feet, at its steps, above the sea. This large two towered building shows white against the dark background. It is one of the largest and best preserved establishments of the kind in California, and in the gardens attached to it the grape and olive were cultivated with success. It was founded December 4, 1786.

Regular and frequent communication by steamers, sailing vessels, and by stage is maintained with San Francisco and other ports, and it is in telegraphic communication with San Francisco and San Diego. In 1880 the population of Santa Barbara Township was 3,469.

On the beach at Santa Barbara the great *earthquake waves*, propagated from the coast of Chili, have been observed receding and leaving the beach broader than usual at low water and then coming in quite heavily. In September, 1812, the five great shocks and waves which destroyed the Mission churches of San Juan Capistrano, Santa Ynez, and La Purisima were felt at Santa Barbara, when the water receded from the shore and then returned in five or six heavy rollers, which overflowed the plain, and is said to have reached inland more than half a mile, to the lower part of the town.

THE SIMOOM.

The only instance of the simoom on this coast, mentioned either in its history or traditions, was that occurring at Santa Barbara on Friday, the 17th of June, 1859. The temperature during the morning was between seventy-five and eighty degrees, and gradually and regularly increased until about one o'clock p. m., when a blast of hot air from the northwest swept suddenly over the town

and struck the inhabitants with terror. It was quickly followed by others. At two o'cloc thermometer, exposed to the air, rose to one hundred and thirty-three degrees, and continu or near that point for nearly three hours, whilst the burning wind raised dense clouds of in pable dust. No human being could withstand the heat. All betook themselves to their dwell and carefully closed every door and window. The thick *adobe* walls would have required da have become warmed, and were consequently an admirable protection. Calves, rabbits, birds, were killed; trees were blighted; fruit was blasted and fell to the ground, burned only on side, and gardens were ruined. At five o'clock the thermometer fell to one hundred and two two degrees, and at seven it stood at seventy seven degrees. A fisherman in the channel open boat came back with his arms badly blistered.

At the entrance of the valley of El Coxo, near Point Concepcion, whilst engaged in mak astronomical observations, during July, August, and September, 1850, we frequently experie at night hot blasts coming down from the Sierra Concepcion after two or three days of clear, hot weather, the north winds apparently bringing the heated air from the valleys behind the sier The records show many cases where stars suddenly became so very diffused, large, and unst by these short hot blasts as to be unfit for observation. Beyond the annoyance and delay sioned by this circumstance no observations were made to determine the temperature of the h air. It had, of course, not near so elevated a temperature as that sweeping over Santa Ba and was quite fitful.

Magnetic Variation.—In January, 1885, the line of equal magnetic declination of fifteen de east passed irregularly through the Santa Barbara Channel. Its general direction is east northeast, passing just north of San Miguel Island to Santa Barbara, and is then deflected along coast to San Buenaventura, where it takes a northeast-by-east direction. The line moves w ward 1'.1 annually.

In 1542 Cabrillo passed this place between his anchorages at Sand Point and near G Point. He found great numbers of Indians along these shores, who came off to his ships in canoes, and were quite friendly and hospitable.

Santa Barbara was known to some of the early navigators as the Road del Principe, sketch of it, embracing four miles of the coast-line, was made by Don Josef Tobar y Tama 1786.* The line of soundings outside the kelp line or "Yerba bal" is seven fathoms. A rancheria existed three miles east of Santa Barbara and another near the present site of the t The points to the westward were Punta de Neve (Point Castillo or Felipe), Punta de Ma (Santa Barbara Point), and Punta de San Ignatio, near the light-house.

In 1793 Vancouver visited the place and observed the latitude as 34° 24' north.

The Coast-Line from Santa Barbara Light to Point Concepcion Light.—This nearly str line of coast runs west by south for thirty-seven and three quarters miles.

Behind Santa Barbara the *Sierra Concepcion* attains its greatest elevation of three thou eight hundred and twenty three feet within four and one half miles of the sea. The flank o range is here deeply scarred by ravines and gullies, and sparsely covered with timber, bu rolling foot-hills are well covered. From some of the ravines and gorges issue many small str formerly abounding with trout. From others issue warm springs having a temperature of a 117° Fahr. and highly impregnated with sulphuretted hydrogen. The height of the sprin barometric measurement is about one thousand two hundred feet. They lie behind the villa Montecito, three miles to the eastward of Santa Barbara.

The old coast road to San Francisco passes along the shore for a distance of fifteen or tw miles to the Gaviota Pass; thence inland to the Santa Ynez Valley, which runs nearly pa with the coast on the north base of the Sierra Concepcion. The new coast road leaves the about eight miles west of Santa Barbara and passes over the mountains at an elevation o thousand five hundred feet.

Sulphur in large beds, and of superior quality, exists along the seaboard and manifests in all the warm springs.

The rugged hills westward of the Gaviota Pass come close to the shore, forcing the tra to leave the beach for their sea slope, the trail passing over steep ridges and across sharp va

The sandstone terraces of the immediate vicinity are about eighty feet high at the Ga Pass and dip at an angle of forty degrees into the sea, forming a bulwark of natural mas against further encroachments. This elevated terrace continues from Santa Barbara to Point

*Published by Dalrymple in 1789.

cepcion, although it is forced back from the immediate shore-line in one or two places. In this distance it is cut by numerous arroyos running down from the mountains. There is only one pass between the River Buenaventura and Point Concepcion, and that is the Gaviota, which at its summit at Santa Cruz is seven hundred feet above the ocean.

To the westward of Santa Barbara are several "landings," where produce is shipped by means of lighters anchored outside the surf. Some of them have substantial wharves, at which the coasting steamers receive and deliver freight.

*Goleta Point.**—The first of these landings is the Goleta, sometimes locally known as More's Landing. It is under Goleta Point, which forms the western side of a bight near the entrance to Goleta Estero. The point is south eighty degrees west (S. 80° W.), distant six miles from the Santa Barbara Light-house, on the same bearing as the Point Concepcion Light. Between these two lights the coast is high, except for three or four miles east and west of Goleta Point, where a series of lagoons and low lands stretch back over two miles. From the extremity of Point Goleta, which is a mesa thirty feet high, the low cliff shore runs northward three quarters of a mile to the low sand-spit, which stretches thence to the eastward for about one mile to again meet the low bluff running towards Santa Barbara with increasing height. The entrance to the estero is about two thirds of a mile along the sand-spit after leaving Pelican Bluff, and the landing was formerly at this point. But Goleta Landing is now further to the eastward, two miles north sixty-one degrees east (N. 61° E.) from the point, and nearly four and one-half miles west from the Santa Barbara Light-house. Here a wharf six hundred feet long has been built out to ten feet at low water, and at which the steamers land to receive and deliver their freight. This is the shipping place for the vast quantities of asphaltum found in the vicinity.

Immediately under the east side of Goleta Point there is a slight break in the shore kelp-field. Thence to the eastward to within two miles of Santa Barbara Light the field is broad and compact, with five to six fathoms throughout it and no known dangers. Outside of it the depth increases to twenty fathoms at one and a half miles off the shore of the bight, with a bottom of soft green mud. Off Goleta Point the depth of water is eight fathoms close in among the kelp; to the westward the kelp-field is unbroken past Coal Oil Point and five miles beyond. It is close inshore at the point, with eight to ten fathoms on its outer edge, and increases in breadth to nearly a mile, where there is a ledge (described under the head of the *Santa Barbara Channel*).

From Point Goleta to Point Concepcion Light the distance is thirty-one and two-thirds miles and the bearing south eighty degrees west (S. 80° W.).

Coal Oil Point.—Two miles west by south (W. by S.) from Goleta Point is another low mesa point, known to the sailing masters by the above name. Between it and Goleta Point the shore-line is nearly straight; to the westward it retreats to northwest by west (NW. by W.) for two or three miles, where the low bluff becomes higher. Immediately behind the point is a large lagoon surrounded by mesa land, which is from one and a half to two miles broad. Immediately off the point the kelp is a narrow, compact field, with eight fathoms on its outer edge and twenty fathoms within a mile from shore, over a bottom of fine gray sand and green mud. The one hundred fathom line approaches Coal Oil Point closer than at any place between Point Hueneme and Point Concepcion; it is only three miles from shore, with a bottom of soft green mud. The two-hundred-fathom line is only three and a half miles off shore, over the same character of bottom; and, in fact, the three hundred fathom basin of the channel heads towards this low land.

In the channel abreast of Coal Oil Point the smell of petroleum is almost overpowering for a mile or two off shore, and it penetrates every part of a vessel. It covers the water with an iridescent pellicle, and is plainly visible even in moonlight. A steamer will run through this coal-oil atmosphere in about ten minutes.

In October, 1542, Cabrillo anchored in the bight about two and a half or three miles westward of Coal Oil Point, where Cooper's Landing now is.

Next in order are several small landings without wharves, where produce has been shipped by means of lighters and boats. *Cooper's Landing* is at the mouth of the Cañada de las Armas, two and one-fifth miles west-northwest (WNW.) from Coal Oil Point and ten miles from Santa Barbara Light. *Dos Pueblos Landing* is twelve and one-half miles from Santa Barbara Light and two and one half miles westward of Cooper's Landing, at the eastern limit of the long field of kelp

*This has been previously known in the Coast Survey work as Point Pelican. On an official map of the Ranchos of California it is called Point Salinas. It is named from the fact of a schooner having been built in the lagoon near it, years before the country was transferred to the United States.

hence to Santa Barbara. The *Tahuiras Landing* is seventeen miles westward from Santa Ba Light and near the Cañada del Refugio.

Cabrillo anchored either abreast of the Cañada del Refugio or a mile to the westward.

Gaviota Landing.*—The coast-line at the opening of the Gaviota Pass has already be scribed. The sandstone cliffs are about eighty feet above the sea, and dip at an angle of degrees towards the water. The cliffs present a terrace-like surface from seaward, with a pecu bright and smooth front, owing to the line of stratification being parallel with the coast-line. bulwark of natural masonry is cut through by arroyos, the largest of which is at the Gaviota This pass is the mouth of a cañon cutting through the Sierra Concepcion to the Santa Yne ley, which lies about ten miles to the northward and parallel with the range.

The landing is at the mouth of the Gaviota Pass, twenty-six miles to the westward of S Barbara Light and twelve and one third miles nearly northeast (NE.) of Point Concepcion It has a substantial wharf one thousand feet long, built out to sixteen feet at low water. outer end of the wharf is inside the inner edge of the kelp-field. Vessels coming to this wh night are aided by a light shown from the warehouse on the outer end. They pass throu kelp field and into clear water inside. When approaching at night the kelp can be readi tinguished by the smoother surface, which is frequently unruffled and bright in moon Steamers run along the west side of the wharf and head north by west (N. by W.) when ly it. There is generally a strong wind from shore, apparently drawing through the pass, even there is no wind elsewhere. In approaching the landing, vessels lose the Point Concepcion l when one mile outside, but at that distance the bright bluffs can be made out.

Mount Gaviota is the landfall for making the landing. It is the highest peak east of P Concepcion, and the rise is very marked from the pass. About three miles west of the pass three peaks in the lower range of the mountains, which are used as approaching marks b steamer captains.

Gaviota is one of the shipping points of the Santa Ynez Valley and the smaller valleys. traffic is done by steamers, and no sailing vessels come here except with cargoes of lumber; two annually. It is never too rough for steamers to discharge and load. A large amount of and other produce is shipped from this landing.

Vessels should not anchor near the Gaviota Pass on account of the prevailing high w from the northward and westward which sweep through it. There is good anchorage three to the eastward of the pass under the first slight point, just inside the outer edge of the where seven fathoms may be had over fine gray sand. At this place the kelp is somewhat br The approach to the shore by lead is regular. The thirty-fathom line is from a mile to a mile a half off shore over a bottom of fine gray sand, and the forty fathom line from two to two half miles over fine gray sand and mud.

Tides at Gaviota Landing.—The Corrected Establishment, or average time of high water the moon's meridian passage, is 1X^{h} 26^{m}, and the average rise of the tide above the mean lowe waters of each day is four and nine-tenths feet.

To find the times and heights of each high and low water throughout the year, take the t and heights for the given tides for San Diego from the annual tide-tables of the Coast Survey for the time of high water add sixteen minutes, and for the height subtract four tenths of a for low water add thirteen minutes, and for the height subtract two tenths of a foot.

The anchorage off the Gaviota is certainly the Puerto de las Sardinas of Cabrillo, 1542. this locality Vizcaino, 1602, locates "a large Indian town." Gaviota anchorage was named b Portolá expedition, in 1769, La Gaviota.

Gaviota Peak.—This peak, in the crest-line of the chain of the Sierra Concepcion or S Ynez Mountains, is two and one half miles north nineteen degrees east (N. 19° E.) from the the wharf at the mouth of the Gaviota Pass, and attains an elevation of two thousand four dred and fifty-seven feet. It is in latitude 34° 30′ 09″.7 north, and longitude 120° 11′ 58″.6 It is the landfall for making the Gaviota Landing.

EL COXO ANCHORAGE.

One and a half miles east-northeast (ENE.) from Point Concepcion Light-house is the an age of El Coxo, off the valley of the same name. It is thirty six and a quarter miles from Santa Barbara Light. One mile south eighty-two degrees east (S. 82° E.) from Point Concep

* Sea Gull. Another meaning has been assigned to it—a forked tree; and hence a notch or fork in the mount

Point Conception Light-house, W. ¼ S., 12¼ miles.

Coxo Point. Coxo Anchorage.

Point Conception, W. ¼ S., 6 miles.

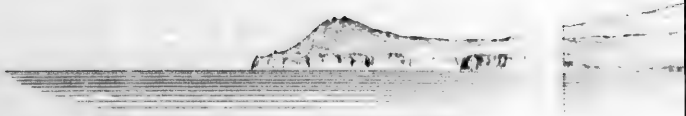
Coxo Point. Coxo Anchorage

Point Conception Light-house,
W. by N. ¼ N., 2¼ miles.

Anchorage.

Coxo Anchorage.

Tranquillion Mountain, 2,136 feet.



Point Conception Light-house, Government Point, NW. by W. ¼ W., 5 miles.

Santa Rosa Island, SE. ¼ E., 37 miles.

nt,

Coxo Anchorage

Santa Cruz Island 42 miles

Point Conception Light house
1 SE 7 miles

San Miguel Island, SE. by S. 20 miles

Light is a low rocky point known as Government Point, only twenty feet above the sea, although rising slowly inland, and three-quarters of a mile northeast by north (NE. by N.) from this point is the anchorage of El Coxo.

The great belt of kelp which has continued almost uninterruptedly from Santa Barbara ceases at El Coxo, and the sudden change of the shore-line towards the south for three-quarters of a mile, with moderately high cliffs, forms an anchorage that is better than Santa Barbara, with the kelp much less compact. We first landed upon the beach of this cove in 1850, and for more than three months were encamped in the valley of the same name opening upon the anchorage. Vessels coming from the northwestward pass Point Concepcion at a distance of about three-quarters of a mile, then run east by north, and gradually round the low bluff (Government Point) one mile distant from the cape, giving it a berth of half a mile; then run on a north-northeast course for three-quarters of a mile, when the valley will open, with a sand beach off it. On the west will be moderately high bluffs, cut by two small arroyos. Anchor outside or inside the kelp, according to the choice of depth, five fathoms being obtained within a quarter of a mile of the shore, with hard, sandy bottom. Ten fathoms water will be found half a mile from shore.

About one and a third miles eastwardly of the Coxo is the anchorage of the old Coxo,* off the mouth of a small stream, where there was (1887) a whaling station. The anchorage is open, but it is represented that the surf does not break so heavily on the beach, because a reef stretches outward from each point of the cove and towards the middle line of the entrance. These small reefs break the full force of the western swell.

The primary astronomical station of the Coast and Geodetic Survey (1850) was at El Coxo, on the top of the bluff, one hundred and ten feet above the sea, and between two hundred and fifty and three hundred yards west half south (W. ½ S.) from the mouth of the creek. Its geographical position is as follows:

Latitude	34°	27′	02″.7	north.
Longitude	120°	26′	50″.6	west.
Or, in time	8h	01m	47s.4	

The magnetic variation was 15° 08′ east in January, 1885, with a yearly increase of 1′.2.

A hydrographic sketch of the anchorage was first issued from the Coast Survey Office in 1852. Since then the location is sufficiently shown on the Santa Barbara Channel Sheet of 1882.

There is a large rancho at El Coxo, and it is one of the very best tracts for grazing. At the head of the valleys and in the mountains is a species of large live-oak, very brash when newly cut, but growing hard by seasoning.

The water of all the streams in this vicinity is quite bitter, but in the mountains, where the streams pass over the granite, the water is good.

Ferrelo says "they called this harbor of Galera the Puerto de Todos Santos," and Cabrillo anchored here November 2, 1542. There was a very large town here at the time called Xexo.

In passing the valley of El Coxo, in 1793, Vancouver saw an Indian village, the inhabitants of which made signs for him to land. The last canoe of the Indians in this vicinity was accidentally destroyed by our party in 1850.

POINT CONCEPCION.

This characteristic and remarkable headland, about two hundred and twenty feet high, lies on the north side of the western entrance to the Santa Barbara Channel, which is twenty miles wide between dangers. Once seen, it will never be forgotten. When made from the northward or from the eastward it rises as a small island, but upon approach it is found to be a high promontory, stretching boldly into the ocean and terminating abruptly. The land behind it sinks comparatively low and then gradually, but soon rapidly, rises to the mountains, which attain an elevation of about two thousand five hundred feet, within three and a half miles of the point.

Depth of the Santa Barbara Channel.—The distance from Point Concepcion to Richardson Rock, off San Miguel Island, is twenty one miles in a south half east (S. ½ E.) direction nearly, and on this course the distances of the curves of equal depths of water off Point Concepcion are, fifty fathoms at two miles, one hundred fathoms at three and three-quarters miles, one hundred and fifty fathoms at five miles, two hundred fathoms at seven miles, and two hundred and fifty fathoms at ten miles. From forty fathoms on the north side to sixty or seventy fathoms on the south side the bottom is gray mud.

* *El Coxo Viejo.* On the Coast Survey chart it is renamed Little Coxo.

Dangers.—The water off this headland of Point Concepcion is bold. The only hidden known immediately under the cape are a *large rock*, nearly awash, between three and dred yards south of the face of the cape, on which some of the California steamers have very foggy weather, before the placing of a fog signal here, and a *rock* with three feet upon it four-tenths of a mile west-northwest (WNW.) from the light-house and one-qua mile off the western shore. A patch of kelp is laid down about it. It is one hundred yards off a visible rock, which is eighty by twenty yards in extent.

Soundings around Point Concepcion.—The three fathom curve follows the shore-line about one-fifth of a mile distant; the ten fathom curve is half a mile off, abreast the sunken rock above mentioned, and keeps this distance quite regularly for some seven miles Point Arguello, when the distance is nearly three quarters of a mile; the twenty fath one mile off the shore west of the light, and increased to one and three-eighths miles at point.

Vessels from the northwestward, after rounding Point Arguello and approaching Pe cepcion, in favorable weather make Santa Cruz Island just tangent to the Cape, near same shape, and having the same height above the horizon. Santa Rosa and San Migue long, low islands further to the south and west.

The *kelp* is moderately thick all along the shore to the northward, but all inside the ten line, except in one spot two and one half miles from the light house, where it reaches t fathoms seven tenths of a mile off shore.

The *bottom* inside the ten fathom curve is varied in character, sandy, rocky, gravelly, tween ten and thirty fathoms, mostly fine gray sand, with rock in a few spots; outside fathoms, fine gray sand, occasionally mixed with mud; outside of two hundred fathoms it is invariably gray mud, although to the northward of Point Concepcion it is occasionally mixe black sand and less frequently with gravel.

Deep sea Soundings.—Several deep-sea soundings have been made from forty to fift west by south from Point Concepcion. These are tabulated on page 109.

A topographical sketch of the point accompanies the Superintendent's report of the and Geodetic Survey for 1851, and a detailed survey of it was made in 1869. The Santa B Channel sheet of 1882 exhibits the point and the mountains behind

LIGHT-HOUSE AT POINT CONCEPCION.

The buildings and the light were for many years upon the highest part of the cape, two hundred and twenty feet above the sea, and covered with grass and bushes, like the hind; but the summit of the cape being frequently covered with fog, while the lower part or partially clear, the light-house, with other buildings, has been located on the pitch of t while the old buildings on the summit remain there as good day marks.

The light-house is built on the southeast part of the point within thirty-three yard shore, on a slight bench of the rock, and as seen from the south will appear projected ag sloping face of the cape. It is one hundred and thirty yards from the southwest face of th The buildings for the steam fog whistle are on the southwest (SW.) pitch of the cape.

The light house structure consists of a low, brown tower of great massiveness, rising and above a low, brown building. The dome of the lantern is painted red.

During the removal of the light to its new position, a temporary light of the fourth ord shown from the old tower from May 25 to June 20, 1882, and the light in the new position exhibited on June 20. It is a *primary sea coast light*, consisting of an illuminating appa the first order of the system of Fresnel, and exhibits from sunset to sunrise a *revolving wh showing a flash every thirty seconds.* The rate of revolution may vary slightly on account condition of the machinery. On the 26th of March, 1873, we observed the time to be two and a quarter seconds, of which the length of the total eclipse was eleven seconds, the part two seconds, the bright flash seven seconds, and the partial light two seconds.

In December, 1884, we found the duration of the flash seven seconds and the dura eclipse, or obscuration, nineteen seconds. When within six or seven miles of the light it do wholly disappear. The arc of visibility extends from north twenty-eight degrees west (N. around by west, south, and east, to north forty degrees east (N. 40° E.), being limited only margin of the bluff in either direction. The base of the tower is ninety-six feet above the

level of the sea, and the height of the focal plane of the light is one hundred and thirty-five feet above the sea. It should be visible in a favorable state of the atmosphere from a height of—

10 feet above the sea, at a distance of 16.8 miles.
20 feet above the sea, at a distance of 18.3 miles.
30 feet above the sea, at a distance of 19.5 miles.
60 feet above the sea, at a distance of 22.1 miles.

Its geographical position, as determined by the Coast and Geodetic Survey, is:

Latitude	34	26′	49″.4 north.
Longitude	120	28′	17″.7 west.
Or, in time	8h	01m	53s.2

The computed magnetic variation was 15° 10′ east in January, 1885, and the yearly increase is 1′.2.

The buildings of the light-house, fog-signals, coal-house, etc., give the face of the cape the appearance of a small village.

It should be noted that in the "Lights and Tides of the World" (by James Imray & Sons, London, 1882), the old light is described on page 198. In the "Light-Houses of the World" (Findlay, London, 1881), the old light is described, page 198.

FOG-WHISTLE AT POINT CONCEPCION.

The fog-bell at Point Concepcion was discontinued on the 26th of September, 1872,* and since then a twelve-inch steam fog-whistle has been in operation during thick and foggy weather, day and night. It is sounded every minute; the duration of the blast is *eight seconds*, and the interval between the blasts is *fifty-two seconds*. There are duplicate whistles and engines, which are placed in two small white-painted wooden buildings on a slight plateau at the southwest pitch of the cape, where the ground is about sixty feet above the sea-level. They lie ninety-five yards west by south (W. by S.) from the light, and only sixty-one yards from the extreme point of the cape. The two black iron smoke-stacks of these engine-houses are seen above the buildings in which they are placed.

It is reported that the fog-whistle at this station is only used as much as two hundred and forty hours in the year, indicating that the cape itself is not particularly enveloped in fog.

From Point Concepcion Light we have the following bearings and distances to prominent objects:

Santa Barbara Light-house	N. 80	E., distant 37¾ miles.
Point Hueneme Light-house	S. 87½	E., distant 66¼ miles.
East point of Anacapa Island	S. 80	E., distant 62 miles.
Northwestern point of Santa Cruz Island	S. 66	E., distant 36 miles.
East point Santa Cruz Island	S. 37	E., distant 29 miles.
Prince Island, in Cuyler's Harbor, San Miguel Island	S. 34½	E., distant 24¼ miles.
West point of San Miguel Island	S. 17¼	E., distant 25 miles.
Richardson Rock,† off west point of San Miguel Island	S. 9	E., distant 21 miles.
Rocky Point, one mile southeast of Point Arguello	N. 65¼	W., distant 10¼ miles.

Climatic Conditions off Point Concepcion.—Next to the islands of the Santa Barbara Channel, Point Concepcion is the most prominent and interesting feature between San Francisco and the peninsula of Lower California. It has very justly and apropriately been termed the "Cape Horn" and the "Hatteras" of the Pacific, on account of the heavy northwesters that are here met with on coming through the channel, with a great change of climatic and meteorological conditions, the transition being remarkably sudden and well defined. An investigation of the temperature of the ocean northwest and east of the cape would be highly instructive, as some characteristics would naturally be expected from the abrupt change in the direction of the mountains and coast-line.

Off Point Concepcion the coast-current runs well to the southward and eastward, striking through the passages between the islands. Close under the north shore of the Santa Barbara Channel the current runs to the westward as an inshore eddy stream.

Point Concepcion was discovered by Cabrillo in November, 1542, and called Cape Galera. He placed it in latitude 36½° north, but his detailed description leaves no doubt of the cape intended. It was afterwards named Punta de la Limpia Concepcion.

* Imray, in "*The Lights and Tides of the World*" (1882), still describes the bell and omits the whistle.
† Called *Farallon de los Lobos* on the Spanish charts. First called by the present name on English charts.

Vizcaino named it Punta de la Concepcion, 1602–1603.

In 1769 the latitude of the point was determined by Don Michael Constanzo, engineer to Governor Gaspar Portala's expedition, as 34° 30'.

The extent of shore line from the southern boundary of California to Point Conception is about two hundred and fifty miles.

THE ISLANDS OF THE SANTA BARBARA CHANNEL.

The name *El Canal de Santa Barbara* was given by Vizcaino, in December, 1602, to the narrowest part of the channel, lying east and west and about seventy-two miles in length, between the main-land and the islands San Miguel, Santa Rosa, and Santa Cruz, whilst the name of San Pedro Channel is applied to the passage between the ocean face of San Pedro Hill and Santa Catalina Island, but we shall speak of all the islands generally as belonging to the Santa Barbara Channel, especially as that name is retained in the general chart of the Spanish discoveries between 1602 and 1791, of which we have a tracing, a true copy certified by Navarrete in 1841.

Until the Coast Survey first examined in detail the islands lying off the main, between San Diego and Point Concepcion, nothing accurate was known of their number, peculiarities, extent, or position. Upon all maps, of as recent date as 1850, an island called San Juan was laid down, and upon a map of the Republic of Mexico, compiled in the United States, and dated 1847, no less than twelve large islands, the positions and extent of which are most grotesquely erroneous. The island of San Miguel, the most western of the Santa Barbara group, is placed 60 miles southeast of Point Concepcion, instead of twenty-three miles southeast by south half south. The same general remarks will apply to the coast line as thereon represented. Three large rivers are made to flow into the sea between Santa Barbara and San Diego Bay, which is increased in size to twenty miles by fifteen, and running north, whilst two others rival it in extent. The topographical positions given previous to the Coast Survey operations are remarkably erroneous. I recollect well, when coming upon this coast, of finding in good nautical authority Point Conception over six miles distant from the latest determination in latitude.

In Findlay's Directory for the Pacific Ocean, published in 1851, there is a description of the already-mentioned San Juan Island, but no very definite location is assigned to it. In Tebbetts' large Atlas of Charts it has a query to it. It may not be uninteresting to state how the error has been perpetuated. The first notice we can find of this island is its discovery by Martinez, in 1789, on his passage from Monterey to San Blas. It again appears in Vancouver, Vol. II, page 1, where the following account is given:

> At the distance of about eight leagues, some where about north 55° west, or north 60° west from Point de la Quadra, by a very uncertain estimation, is situated an island called St. John's, between which and the coast we passed without seeing it (although he previously states having seen San Clemente and Santa Catalina), nor did we observe it while we remained at anchor, excepting on one very clear evening, when it was seen from the presidio (of Santa Barbara) at a time when I was unprovided with a compass or any other means of ascertaining its direction, and was therefore only able to guess at its situation.
>
> It appeared to be low and flat, is but seldom seen from the Presidio of San Diego, and was undiscovered when seen by Martinez, a few years before, in one of his excursions along the coast.

As Vancouver has plotted this island on the line from Point Loma to San Clemente, and as it is generally so placed, we have no hesitation in assuming that, during peculiar and extraordinary conditions of the refraction of the atmosphere, the island of San Clemente, invisible under ordinary conditions of refraction, has been seen and mistaken for another and intermediate island.

Having visited and examined San Clemente, Santa Catalina, San Nicolas, Santa Cruz, and San Miguel, we found them offering no inducements for agriculture and very few for raising stock. In a few words, we may characterize their disadvantages as want of water, and want of fuel. They have high, bold, and rugged sides, which in many places become precipitous. The surface of San Miguel and of Santa Rosa is rolling and covered with grass and bushes. The mountains of Santa Catalina are high and covered with chaparral. San Nicolas and San Clemente are composed of coarse sandstone, presenting a dry, sandy, and sterile aspect. Anacapa is a long, high, narrow ridge of rock, and the islet of Santa Barbara has precipitous walls rising to five hundred feet above the sea.

On the chart of the coast from San Diego to San Francisco, published by the United States Coast Survey, a remarkable and beautiful exhibition of the parallelism between the islands and the adjacent coast is presented. The four islands, Anacapa, Santa Cruz, Santa Rosa, and

Miguel (with the rocks seven miles west by north from the last named), lying broad off the coast between San Buenaventura and Point Concepcion, have their longer axes parallel to the trend of the shore-line, which is the general direction of the Sierra Concepcion immediately behind it. These islands are a continuation of the Sierra Santa Monica, which has been cut through at certain points. The terrace markings on their eastern and western extremities are well marked in some places.

In Vizcaino's voyage this parallelism was noted west of Santa Catalina,

where a regular row of islands exist, five or six leagues distant from each other, all populous, and the inhabitants trading with each other and the main, and the islands following each other in the same direction as the main-land.

Cortes Shoal, the islands of Santa Catalina, San Clemente, San Nicolas, with the John Begg Rock, seven miles from its northern extremity, have their longer axes northwest by west and parallel to each other, whilst the island of Santa Barbara is on the prolongation of the longer axis of San Clemente. In the third parallelism, near the extreme southern part of California, the direction becomes perpendicular to the first described, for from latitude 33° 05′ north the trend of the coast and hills southward, through the longer axis of Point Loma, will pass through Los Coronados, although the islands lie northwest with respect to each other.

Among the islands as far as San Nicolas the ocean current runs to the southward, with variableness through the different passages and over the Cortes Bank.

Islands, Shoals, and Rocks.

CORTES BANK.

Commencing at the southward, the first object that claims our attention is the dangerous bank and rock called the Cortes Bank, bearing southwest quarter west (SW. ¼ W.) from the southeast end of the island of San Clemente, and distant forty-six miles. The extent of this bank has been sounded out carefully and found much greater than the early examinations led us to suppose. Within the limits of the fifty-fathom curve the general trend is parallel with the islands of Santa Catalina, San Clemente, and San Nicolas, and it stretches about seventeen miles, from latitude 32° 24′ north, longitude 118° 59½′ west, to latitude 32° 32′ north, longitude 119° 17½′ west, but curves slightly to the southwest. It has an average and nearly uniform width of three and a half miles. The nature of the bottom is hard, composed of white sand, broken shells, and fine coral at the southeast portion, and sand, with broken shells, at the northwest. The shoalest and most dangerous part is that known as the *Bishop Rock*, lying five miles from the southeast tail of the bank, and having but two and a half fathoms of water upon it. Around this danger the depth increases gradually, and in an extent of two and a half miles in the general direction of the bank reaches but fifteen fathoms. The geographical position of this rock is, very closely:

Latitude	32	25¾ north.
Longitude	119	06′ west.

From the westernmost point of the island of San Nicolas the rock bears south forty degrees east (S. 40° E.), distant fifty six and three-quarters miles, and from the eastern point of the island south thirty-four degrees east (S. 34° E.), distant fifty one and one half miles. From the eastern point of the island of San Clemente the rock bears south forty-three and one half degrees west (S. 43½° W.), distant forty-four and three-quarters miles, and from the western point of the island south twenty degrees west (S. 20° W.), distant forty-four and one-quarter miles.

From the Bishop Rock to the west end of San Miguel Island the course is north forty-nine and two-thirds degrees west (N. 49⅔° W.) and the distance one hundred and eighteen miles.

The next shoal spot is one of ten fathoms, about the middle of the bank, and of limited extent, being only half a mile square within the fifteen fathom curve. Its geographical position is, approximately:

Latitude	32	26¾ north.
Longitude	119	10¼ west.

From the northwest end of San Nicolas the spot last mentioned bears southeast by south (SE. by S.), distant fifty-four miles, and from the southeast end of San Clemente it bears southwest quarter west (SW. ¼ W.), distant fifty miles. From the Bishop Rock it bears west quarter north (W. ¼ N.), distant five miles.

To the northwestward of this latter shoal spot, the depth is nearly uniform at forty-n
oms for seven and a half miles, and between it and the Bishop Rock the depth is uniform
forty-three fathoms. An isolated sounding of forty three fathoms was made by the survey
sel in 1856 twelve miles north three-quarters west of Bishop Rock, with deeper water n
shore.

Current.—Upon this bank the current is variable, frequently setting against the stron
west winds with a velocity of nearly two miles per hour, and producing at all times a heav
and even in moderate weather breaking heavily upon the Bishop Rock. At other times
rent has been found to run in an opposite direction nearly as strong. In passing over the
night we have been sensible of our proximity to it by the increased swell. In the detail
ination of 1856 it was found that the general set of the current was to the southward
ward and the greatest velocity a mile and a half per hour, but no statement is made co
the prevailing wind. On the evening of August 3, 1856, during the examination of the ba
was a storm of lightning and thunder and a heavy shower of rain. These conditions ar
unusual, although we had a southeast storm at Point Concepcion in August, 1850.

Deep-sea Soundings off the Cortes Bank.—In 1873 the U. S. steamer *Tuscarora* ran sou
sea soundings from San Diego towards the southern edge of the Cortes Bank and thence w
to the eastern limit of the Pacific plateau. The following table exhibits the geographical
of each sounding and its bearing and distance from the Bishop Rock:

Latitude	Longitude	Depth	Bottom	From Bishop Rock: Bearing	Distance
					Miles.
			Gray and black sand	S. 61 E.	
			Light greenish mud and sand	S. 11 E.	
			Yellowish mud and sand	S. 83 W.	
				S. 81 W.	

The existence of this bank had been reported several times and the following pos
signed to it:

Swift's Island: Latitude 33° 08′, longitude 119° 06′, as seen by Captain Aulick, U. S
Rock: Latitude 32° 30′, longitude 119° 06′; no authority.
Bank: Latitude 32° 28′, longitude 118° 42′; no authority.

It lies in the direct route followed by the Mexican, Panama, and San Francisco st
and was discovered by Captain Cropper, of the steamship *Cortes*, in March, 1853. His
was determined by bearings upon San Nicolas and San Clemente, and was very close, bei
a mile of the latest and best assigned place. He says that the water around it was in vio
motion, and thrown up suddenly in columns at regular intervals of four or five minutes
he thought he saw breakers, and occasionally the water broke as on a reef, but he bec
dent that the disturbance was owing to submarine volcanic agency. The specimens of t
negative this idea. He found his depth of water reduced from forty-two fathoms to t
convinces us that he was on the shoal spot, about the middle of the bank, and saw the wat
ing upon the Bishop Rock, the same appearance that he witnessed having been seen m
since, and the nature of the rocky bottom and depth of water supporting the assump
position of the bank was afterwards more closely determined by the commander of the
Pacific, but in the Coast Survey operations the ten-fathom spot was found, and the
schooner was anchored on it five days.

Attention was subsequently called to a more extended and detailed examination of th
by the clipper ship *S. S. Bishop*, afterwards *Gray Eagle*, of Philadelphia, striking upon
since called by her name (1855); and, under unfavorable circumstances, two points of
supposed to exist, to which approximate positions were assigned. In 1856 the bank wa
out to the extent of one hundred and thirty square miles; and from a consideration of t
favorable circumstances under which this last survey was made, confidence is expressed
point of rock above mentioned is the only one existing; but as it is very difficult to find
single points of rock below the surface in a sea-way we shall not be surprised if others b
ally found. At all events, the prudent navigator will give this bank a good berth. Its
forcibly suggests the probability that other submarine ridges lie parallel to the coast.

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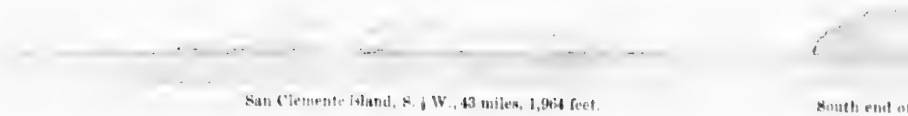
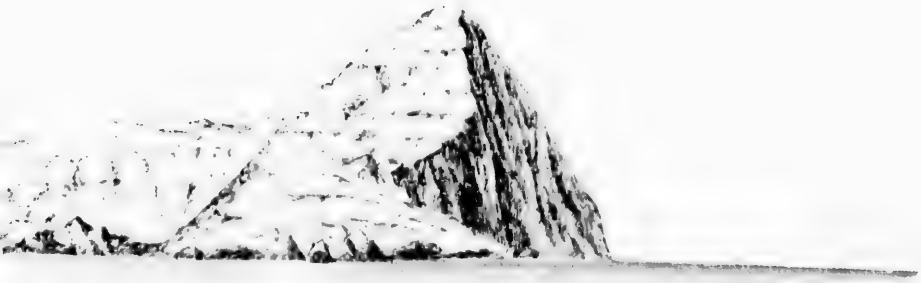


Anchorage under the Southeast Head of San Clemen

South end of Cat... a Island, SSE., distant 17 miles

Reef. Landing, SSE. ¾ E.

Northwest Anchorage, San Clemente Island SSW. ¾ W., 1 mile



W. ¾ N., 1¾ miles. Pyramid Head, NW. by W. ¾ W., 1¾ miles, 920 feet

Southeast Head of San Clement...

SSW ¼ W., 1 mile

WSW. [illegible]

A chart of the Cortes Bank was published by the Coast Survey in 1856, and the name has been erroneously continued as Cortez.

ISLAND OF SAN CLEMENTE.

This island lies forty-two miles broad off the coast at San Pedro Hill. Like all the islands of the Santa Barbara Channel it is high and bold, the southeastern end being the higher. The general trend of the island is northwest half west (NW. ½ W.), its length eighteen and one-half miles, with an average breadth of nearly two and one-half miles. The greater breadth is towards the southeastern end. The area of the island is fifty-one and a half square statute miles. The southernmost point of the island bears west one-half south (W. ½ S.) from Point Loma Light, distant sixty miles.

The published chart of the San Pedro Channel shows the features of the island remarkably well. The northeastern side is straight and very bold, rising sharply to a very uniform ridge running the whole length of the island and terminating precipitously at the eastern point. This crest-line is less than one mile from the shore, except at the middle of the island. On the southern side the shore is much more broken, has lower cliffs, and is bordered by rocks, but none extending over one-quarter mile from shore. The slopes from the backbone are gradual, but cut up by a great many transverse and deep arroyos. This southern slope is well marked by seven or eight pronounced terraces or plateaux.

The crest-line of the island attains an elevation of nineteen hundred and sixty-four feet about one-third of the way from the southeast end, but the grade from the northwest end is so uniform and easy that a wagon could be taken over it. Along this ridge at intervals are the remains of numerous Indian rancherias. Near the center of the island, going from the northwest, is the first natural tank of water, and from here upwards great blocks of stone cover the ground.

The southeast part of the island is much less barren than the northwest part, and towards that end the sheep, with which the island is stocked, mostly graze. The island is reported to be almost entirely a black plutonic rock with a shallow soil upon it. In the deep gulches and in a few isolated spots small clumps of scrub-oak and malva are found. In many places on the south and southwest faces of the island the cactus is very thick. The only spring of water on the island is at the head of a small gulch on the northeastern face, about midway between the northwest and southeast ends and just at the foot of the southern end of the highest plateau. Tanks or "water-holes" are found on the southern and southwestern slopes of the island at the edge of the plateaus where the gulches begin. They are worn out by rocks whirled around in a hole in the heavy rain-falls. Many of them are inaccessible, and now hold the carcasses of sheep that have tried to reach them. The water holes near Smuggler's Cove are shown on the chart.

At the northwestern extremity of the island it has been observed by the Coast Survey party that rain-areas will frequently advance towards the island from the southward, but when within a mile of the shore they break up, and the eastern part of the rain-area continues its advance and settles over the higher parts of the island, whilst the western part changes its course and swings around the northwest end of the island until it reaches the opposite side from which it approached. In this way the southeast end receives much more rain than the northwest end.

Hydrography.—The soundings around the island show a depth of from thirty to one hundred and thirty fathoms close inshore, except off the northwesternmost point, from which a reef makes out nearly one mile. Beside this and the rocks on the west side of the northwest anchorage, the shore of the island has no outlying rocks beyond one-quarter or one-third of a mile. The one hundred-fathom line lies within one-half to two-thirds of a mile off the northeast shore, but two to three and a half miles off the southwest shore, with a bottom of fine gray sand, broken shells, and gravel; beyond that depth the bottom is generally green mud and sand. Off the northeast shore the six hundred-fathom line of soundings is within two miles at its nearest approach towards the western end.

The published chart does not give any kelp-fields around the island.

The Northwest Point of the island is the very low and sharp extremity of a single terraced head that rises to a height of one hundred and ninety-two feet above the sea in a quarter of a mile from the nearest shore. The land is only twenty feet high one-sixth of a mile from the point. A single line of sunken rocks runs out west by north (W. by N.) nearly half a mile to a rocky islet seventy yards in extent. The head is nearly one and a half miles long, north-northeast and south-southwest. Eastward of its northern termination lies Clemente Anchorage, and east of its south-

ern point is Drigg's Cove. Behind the head is a small valley connecting the two coves east and northeast of this valley the land rises gradually to five hundred feet in a mile to the table ridge overlooking Wilson's Cove.

The soundings off this point are irregular, and it is quite probable that the line of carried beyond the rocky islet, because a depth of four fathoms is given at four-fifths west of the point. Outside this shoal spot the depths increase to fifty fathoms at two the point.

The geographical position of this northwestern point is

Latitude				north.
Longitude		115°	2'	west
Or,		7	54.2	

Pyramid Head.—This is the eastern point of the island. It is quite sharp, high, jagged. The cliffs reach nearly two hundred feet elevation on the northwest side, and part of the point is two hundred and fifty feet above the sea and within one hundred seventy yards from it. To the northeast and behind this peak there is a depression which forms a neck, whence the crest of the island rises to hundred and twenty feet in half a mile, then lower, but slighter, depression beyond. The pression the ridge rises to feet in a quarter of a mile, when a thi sion of one hundred and fifty feet. This last peak, which is only one-fifth of a the north shore, forms quite a when seen from certain directions from. The lower peak on the extreme presents a somewhat similar appearance. They consti markable features for making the land. The depression beyond the higher pyr crest-line continues slowly rising to the northward.

The northern shore of Pyramid Head is very roughly broken and precipitous for tha The southern shore, round to Smuggler's Cove Anchorage, is broken, but high as the north shore. The land rises gradually to the crest-line, and is marked by defined terraces. There are no trees on the and point, and this extremity has a ve and forbidding appearance. A view of Pyramid Head and Cove is given in the Coast Report for 1856.

A line of rocks above water and sunken rocks extends two hundred yards to the ea east ENE. from the point.

The soundings off the north and east points are very deep, and on the prolongation of the shore to the southward and eastward a gradual decrease in depth is noticed; to the sou this line the depth is fathoms distant from the point; to the no the line the depth increases rapidly. This, as well as the soundin the island, clearly indicates the direction of the island forme

The geographical position of the extreme point of Pyramid Head is

Latitude				north.
Longitude		115°	2'	west
Or,		7	54.2	

The computed magnetic variation for January 1, 1886, was 14° 15' east, with a yearly of 1'.4.

The Southern Point.—This point is an irregular rocky cliff five hundr broad, rising one hundred and eight feet above the sea. It lies south sixty degrees west three and two-thirds miles from the east point of Pyramid Head. In the moderately d between is Pyramid or Smuggler's Cove. Two high rocky islets lie close under either a point, but there is no passage way between them and the main bluff. Behind the point rises in long ridges for miles to the crest-line. The shore-line to the westward to northwest for four or five miles to Middle Point.

Around the point and between the rocky islets the depth of water is six fathoms mo close inshore, and depths of twelve to sixteen fathoms are found within half a mile of t over fine gray sand and broken shells. At a distance of one mile the general depth is fi oms, with a regular increase towards the southward.

The geographical position of the southeast angle of the point is

Latitude				north.
Longitude		115°	25'	west
Or,		7	54	

The Middle Point.—There are no particularly marked projections from the long curving outline of the southwest shore of San Clemente Island; but when a vessel is close inshore a long narrow point is made out nearly half way below Seal Harbor and the Southern Point. The extremity of this point is comparatively low, the cliffs being not over fifty feet above the water, and only reaching one hundred feet in half a mile. It has rocks close under the cliffs. The point lies five miles north sixty-five degrees west (N. 65° W.) from the Southern Point, and five miles south fifty-five degrees east (S. 55° E.) from Seal Harbor Point, which is just outside the line to the point forming Drigg's Cove.

This point forms the broadest point of the island, and lies nearly under the highest part, being three and one-eighth miles south thirty-three degrees west (S. 33° W.) therefrom.

The point nearly one mile to the eastward of Middle Point is much bolder and higher, rising from the sixty-feet cliffs to the four-hundred-and-twenty-feet terrace in one-quarter of a mile. Above this rise six other well defined terraces, the highest being at fourteen hundred and forty-five feet above the sea. At long distances this *High Table Point* will be seen before the lower land of the Middle Point is raised above the horizon.

The soundings off these points are moderately regular, giving six fathoms of water about four hundred yards from shore, and thirty fathoms at one mile. The one-hundred-fathom curve is nearly three miles off shore.

The geographical position of the extremity of Middle Point is:

Latitude	32	51	08″	north.
Longitude	118	30	05′	west.
Or, in time	7h	54m	00s.3	

Clemente Anchorage.—On the north side of the northwest end of the island there is a small indentation of the shore-line, forming an anchorage, having a width of three quarters of a mile by half a mile in depth, with soundings decreasing from twelve fathoms (on the line of a large rocky islet at the northwest side to a point east by south) to four and five fathoms close inshore. Kelp will be found in ten fathoms; but the bottom is tolerably regular and hard. It is anything but a pleasant or safe anchorage in bad northwest weather, and even in heavy southerly weather the swell must roll in disagreeably. Its relation to the end of the island is shown in the latest general chart. A hydrographic sketch of it was issued from the Coast Survey Office in 1852.

Wilson's Cove.—On the northern side of the island, and two and one-half miles about east-southeast from the Clemente Anchorage, there is a second anchorage open to north and east. There is a great projection of the shore line between them nearly one mile long; and from the eastern point of this projection the shore-line is nearly straight for one mile in a southeast direction to the Cove. The face of this straight shore is very precipitous, rising to four hundred feet in fifty yards. To the eastward of the Cove, the land behind the rounding point rises to seven hundred and forty feet in a long, regular slope for one mile. Between this long incline and the escarpment to the westward there is a small valley, off the mouth of which is the cove and anchorage. Vessels may anchor about two hundred yards off shore in seven to eight fathoms; but there is deep water outside.

The anchorage may be recognized by a long, low ranch-house on the western side of the valley facing the water, and a few yards from high-water mark. To the eastward of this ranch-house about one hundred yards are the corrals and shearing sheds of the company which own the sheep on the island. A wooden water-tank adjoining the house has fallen into disuse, and water, as well as wood, is brought from the main-land during the shearing season.

Except in very heavy northwest blows the anchorage is good in summer, when the water is quite smooth and the wind draws off the shore in strong puffs. The *kelp* grows rather close inshore, and difficulty is sometimes experienced when getting under way, as the anchor fouls in it. The beach is composed of heavy shingle, and before beaching a boat the larger and sharper stones must be cleared away.

Pyramid or Smuggler's Cove.[*]—Under the southeast end of the island, anchorage may be had in the deepest part of the indentation called Smuggler's Cove, but the bottom is rocky and irregular. The bluffs at this place are cut up by deep gulches in which the water has worn its way down to the rock, which contains many fissures, some very deep and filled with fresh water after the rains. The southeasternmost point is a vast sandstone pyramid, and when the easternmost

[*]There is also a *Smuggler's Cove* under the eastern end of Santa Cruz Island, and pre-dating this. This one might very well be designated *Pyramid Cove* for reasons mentioned in the text.

extremity of the point is brought to bear north, and the nearest shore is three-quarters of a mile distant, the anchorage will lie west by north (W. by N.) two miles distant and just at the limit of the kelp, in ten to fifteen fathoms over a bottom of fine dark gray sand, and one and a half mile from the narrow sand-beach at the foot of the cliffs. Outside of the kelp the depth is from ten to thirty fathoms. This anchorage will afford protection in heavy northwest weather. A sunken rock, bare at the lowest tides, has been discovered in the western part of the ten-fathom line. It lies S. 77° W. three miles from the southeasternmost point of the island, N. 39° E. from the western point of the cove. It is a quarter of a mile from the nearest kelp to the north, and there is no kelp about it.

At the western end of the one-mile sand beach, and nearly abreast of the anchorage, are two gulches, half a mile apart, open upon the beach. The eastern one has a pond of brackish water at its mouth near the beach. The "water holes," or tanks of fresh water, up this gulch are about a quarter of a mile from the beach and contain from one to three thousand gallons of fresh water. Barrels may be conveniently filled here and rolled to the beach.

A view of Pyramid Head and approaches to the cove is given in the Coast Survey Report for 1856.

Driggs Cove.—On the south side of the northwest head of San Clemente Island, across from the Clemente Anchorage, there is a small indentation open to the south, but with a partial lee from the westerly swell. The southwestern point of this cove is just one and sixteen degrees east (S. 16° E.) from the northwestern extremity of the island, and the cove lies nearly half a mile inside this point to the northeast by east, where vessels anchor two hundred yards off the mouth of a small, rather broad valley. A line of sand sweeps over the pebbly beach at the cove. The shore to the eastward consists of moderately-low cliffs bordered by rocks. Sunken rocks extend two hundred yards south southwest from the southwest point of the cove, with deep water outside. Seven fathoms of water is found broad in the cove, and fifteen fathoms at half a mile in the approaches.

Seal Harbor.—On the southwestern shore of the island, about midway between the two coves, there is a small indentation of the shore-line open to the southeast. It is a good harbor for vessels of ten or fifteen tons. The western side of this indentation runs north northeast for one third of a mile and then the inner shore runs nearly half a mile southeastward to a low bluff which stretches outward south by west for two hundred yards. There are two rocky islet lying one hundred and fifty yards off this last point.

The western shore of the cove rises about three hundred feet above the sea and is very steep, and the north shore is a cliff bordered by a rocky, low-water line. Outside the middle of the cove there is a rocky islet about ten feet in height and forty yards in extent; and in the east part of the cove there is another rocky islet about sixty feet in height and seventy five yards in extent. This is locally known as *Seal Rock*. These rocks serve to mark the cove and the approaches. A few small rocks lie off the extremity of the point of the west shore. The highest part of the crest line of the island bears east half south (E. ½ S.) from this anchorage.

The Coast and Geodetic Survey secondary astronomical station (1852) was at the Clemente Anchorage, on the grassy rise just inside of the high water line, and bore south fourteen and a half degrees east (S. 14½° E., from the north point of the rocky islet before mentioned. Its geographical position is:

Latitude	33°	01′	45″	north
Longitude	118°	31′	20″	west
Variation	7°	41′	34″	E.

The highest point of the island is nineteen hundred and sixty four feet above the sea. Its geographical position is:

Latitude	33°	00′	00″	north
Longitude	118°	27′	00″	west

San Clemente Island was discovered by Cabrillo on the 6th of October, 1542, and, together with Santa Catalina from the coast, was described as the smaller island, and named Isla Pequeña after the smaller of his vessels.

This island is distinctly visible in clear weather from Point Loma Light-house. A topographical survey of the island has been made by the U. S. Coast and Geodetic Survey, and topographic sketches of Pyramid or Smuggler's Cove and Clemente Anchorage have been made

THE ISLAND OF SAN NICOLAS.

Of the Channel Islands, this is slightly the farthest from the main-land, and is the driest and most sterile. Like San Clemente, it is comparatively flat-topped, with a moderate slope towards the northward. It is eight hundred and ninety feet high, with very bold, precipitous sides of coarse sandstone on the southern and eastern faces and on part of the northeastern face.

Its general direction is west two-thirds north and east two-thirds south (W. $\frac{2}{3}$ N. and E. $\frac{2}{3}$ S.); its length is seven and three quarters miles, with an average and nearly uniform breadth of two and one-half miles. Two-thirds of the surface of the island is covered with sand, and the remainder with coarse grass. Small patches of scrub oak are found in a few places, but no trees show on the island as made from seaward. It can be seen from the deck of a vessel at a distance of thirty-eight miles.

The eastern end of the island is one and one quarter miles broad, high and bold, except at the northeast point, where there is a low sand spit stretching out one-third of a mile, and around which the currents run at times with great force. The western point is quite narrow and pointed, and not so high as the eastern.

Kelp.—The island is surrounded by a field of kelp, except for two and one-third miles on its northeast face. The breadth of the kelp-field on the north averages nearly a mile and stretches out to seven and thirteen fathoms of water. Off the western end of the island the kelp-field covers badly broken ground, and stretches three miles to the westward to fifteen and sixteen fathoms of water. Under the south side the kelp-line is close under the shore, the line of twenty fathoms being within half a mile of the land. From one to two miles off the eastern point of the island is a separate field of kelp, one mile east and west by half a mile north and south. It has six and a half fathoms within it, sixteen fathoms on the east end, and a good channel, three-quarters of a mile wide, between the west end of the patch and the east point of the island.

In the kelp at the north shore there is a notable gap directly in front of Corral Harbor.

The *hidden dangers* off the island lie in the kelp off the western point, where two reefs, within an area of one mile by half a mile, lie west by south half south (W. by S. $\frac{1}{2}$ S.) fully one and a half miles distant. They have eight fathoms around them, and the kelp-field extends half a mile beyond them to fourteen fathoms. No dangers are known beyond the outer edge of the kelp-field. Kellett erroneously places these reefs two and a half miles from the western point of the island. He also lays down breakers for a mile and three-quarters from the eastern point. It is probable that he has been misled by heavy current rips conflicting with the westerly swell; or it is possible there may be some hidden dangers in the kelp-field off the eastern end of the island.

The *Begg Rock* is described on page 76.

Hydrography.—The soundings off the north and northeast sides range from fifteen fathoms at the kelp to thirty and forty at two and three miles; the depth towards the Begg Rock increases gradually from fifteen fathoms at the kelp to fifty at the rock, and no broken ground between, with bottom consisting of sand, mud, and broken shells. Off the south face of the island the bottom drops suddenly to one hundred fathoms in one and a half miles, and to three hundred in less than three miles; bottom, green mud. The thirty-fathom line is here less than a mile from the shore.

Off the northeast point, which is low and sandy, vessels may anchor in ten fathoms over hard, sandy bottom, with a current running steadily to the southward, which makes landing bad, as the surf cuts the beach at an acute angle. The anchorage laid down on the Coast Survey chart is one mile south of the point, at the edge of the kelp, in six or seven fathoms.

Corral Harbor.—On the north side of the island, three and a quarter miles in a straight line from the extreme western point, is a very small boat harbor, where a whale-boat may be carried in, but the passage is only twenty feet in width, so narrow that the oars must be trailed for a distance of forty feet to pass through. Inside this passage the basin expands to sixty feet in diameter at low water, has a smooth sand beach, and is protected from all swell. During the hydrographic survey of the island, tidal observations were made here. A shearing shed and sheep corral on a little rise near the shore can be seen from the outside and mark the place. Steer for them until the opening is seen, and then run in. There is a herd of about one thousand sheep on the island.

The U. S. Coast and Geodetic Survey secondary astronomical station on San Nicolas Island was on the sandy point at the northeast part, and its geographical position was determined as follows:

Latitude	33	14	11.6	north
Longitude	119	30	02	west.
Gr. m. time	7h	57m	44s.4	

The magnetic variation for San Nicolas is computed 14° 45′ east for January, 1885, creases annually 1′.4.

From the sandy point at the northeastern extremity of the island we have bearings tances to prominent objects as follows:

West point of San Clemente Island	S. 87	E.,	distant 44 miles
Point Fermin Light-house	S. 49	E.,	distant 63½ miles, and passing three miles to south and east of Santa Barbara Island
High Peak, Santa Barbara Island	N. 41	E.,	distant 24 miles.
Point Hueneme Light house	N. 3	W.,	distant 55¼ miles
Middle of Anacapa Passage	N. 17	W.,	distant 46½ miles
Middle of entrance to Santa Cruz Channel	N. 44	W.,	distant 49¼ miles
Western point of San Miguel Island	N. 61½	W.,	distant 71 miles

The geographical position of the western point of the island is:

Latitude	33°	16′	36″ north
Longitude	119	34	43 west

From this point the Begg Rock bears north sixty four degrees west (N. 64° W.), dista and three quarters miles.

The highest point of the island is eight hundred and ninety feet above the sea, and graphical position is:

Latitude	33	14	45″ north
Longitude	119	31	25 west

Tides.—Corral Harbor: The average time of high water after the moon's meridian p Xh 09m; and the average rise of tide above the mean of the lower low waters of each da and nine tenths feet. To obtain the times and heights of the high and low waters, first the Tide Tables for the Pacific Coast the times and heights for San Diego; and then t time of high water here, add eight minutes, and to get the time of low water add six mi find the height of high water, subtract six-tenths of a foot; and for low water subtract thre of a foot.

The island of San Nicolas was very probably seen by Ferrelo February 18, 1543, wh Santa Cruz Island to search for other islands reported lying off the inner group; but he name to it.

Vizcaino named it in 1602; but he laid it down very erroneously, for it is placed cl the western side of Santa Barbara Island, and even smaller than it.

It is not located on the Carta General of 1791, and it was not seen by Vancouver in

It was examined by the early fur traders, and, on account of the great number of found there, was known by the name of Sea Otter Island, and its southeast point placed 33° 17′, longitude 119° 10′. It is a very small speck on Arrowsmith's chart of 1798, as if with Santa Barbara Island.

The Indian name is said to be Ghalashat.

The *Begg Rock* is situated on the prolongation of the north shore of San Nicolas Is lies north sixty-four degrees west (N. 64° W.) seven and three-quarters miles from th western point. The rock is about forty feet high, bold and well defined, and can easily a distance of ten miles. The soundings close to it are fifty fathoms, and without ind any connecting submarine ridge with the island, towards which the decrease of depth is ular over a bottom of blue mud and sand to the kelp line, where the depth is fifteen fathe bottom is gravel and broken shells immediately around the rock, and no extensive kelp p rounds it. Its geographical position is:

Latitude	33°	21′	30″ north
Longitude	119	41′	47″ west

Tebenkoff erroneously lays down a line of rocky islets between the Begg Rock and t ern point of San Nicolas.

It was named after the ship *John Begg*, which struck upon the foul ground aroun tember 20, 1824, and was nearly lost. She reported the foul bottom covered with kelp. T tion of the rock relative to the island of San Nicolas is shown on the recent chart of the S bara Channel, published by the U. S. Coast and Geodetic Survey.

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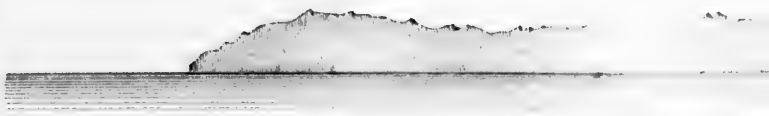


W. by S., 23¼ miles.

Santa Catalina Island

SE. by S. ¼ S., 25 miles.

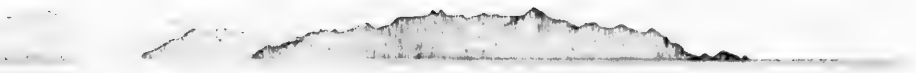
1,786 [illegible] The

Santa Catalina Isl

Santa Catalina Island, SE.

Santa Catalina Island, 2,109 feet.

West Catalina, W. ¼ N., 36 miles, 1,786 feet.



1,786 feet. The Isthmus. 2,109 feet.

SE., dist. 33 miles

Santa Catalina Island

Santa Catalina Island, SE. by E., 51 miles

The Isthmus, SSW., 21 miles. Santa Catalina I.

S. ¾ E., 24¾ miles. Santa Cata[illegible]

Santa Catalina Island, Western part, height, 1,789 feet SW. ¼ W., 22½ miles

Santa Catalina Island, Eastern part, height, 2,109 feet

Catalina Harbor, South side of the Great Depression.

ISLAND OF SANTA CATALINA.

This island lies broad off the coast west of San Pedro Bay and San Pedro Hill, at a distance of nineteen miles. The passage between the island and the main land is named the *San Pedro Channel*, and has already been described, page 11. The island is eighteen miles long, west by north three quarters north (W. by N. ¾ N.), with an extreme breadth of seven miles and an average breadth of four miles to the southeastern part and two miles to the northwestern. The least breadth at the isthmus is half a mile; the shore line amounts to not less than forty-six miles. The general character of the topography of the island is exceedingly rough and mountainous. The shore line along the south side of the island is very bold and difficult of access, except for about three miles. The north shore is also very bold, but has several landings beside the principal cove.

The geographical position of the eastern point of the island is

Latitude	33	1ᵐ	30	north.
Longitude	118°	1ᵐ	30	west.

and bears south fourteen degrees east (S. 14° E.), distant twenty-four miles, from Point Fermin Light house.

The western point is in

Latitude	33	2ᵐ	40	north.
Longitude	118°	36′	25″	west.

and bears south thirty-four degrees west (S. 34° W.), distant twenty and two thirds miles from Point Fermin Light house.

The highest peak of the island rises to an elevation of two thousand one hundred and ten feet and as a landfall it is visible at the distance of fifty miles.

Towards the western end, the island is remarkable for the great transverse break or depression running almost through it, and forming an anchorage or cove at each side. This notable feature of the island bears south seventeen and one half degrees west (S. 17½° W.) from Point Fermin Light house, and is distant nineteen miles therefrom. When coming out of San Pedro Bay, the low isthmus connecting the two parts of the island cannot be seen even from the hurricane deck of the steamers, so that the island appears as two until the higher parts overlap when seen from abreast Point Vincente.

The highest peak on the part of the island westward of this depression is one thousand seven hundred and thirty feet above the sea. The narrow strip of low land connecting the two parts of the island is locally known as the "Isthmus;" it is only about thirty-three feet above the sea, and was marked by a large, white building, formerly the United States barracks. The hills rise up sharply on each side of it over one thousand feet, and when the island is sighted from the north or south the whole, as before stated, appears like two very high islands. The views exhibit this beautifully, and are highly characteristic. When a vessel is abreast Point Hueneme Light house, the island of Catalina is seen as a very low saddle on the horizon at a distance of over fifty miles.

The shores of the island are rocky and precipitous. On the southern side they are fearfully abrupt, and on the northern side the high cliffs are cut by deep arroyos and marked by several indentations. Deep and precipitous gulches are formed by the ridges of rock running diagonally across the island from northeast to southwest, and occasionally a small valley varies the scene. Abreast of these valleys and indentations of the shore line small coasting vessels anchor to discharge and receive freight.

Hydrography of Catalina Island.—The twenty-fathom curve is only one-fifth of a mile off shore, although somewhat irregular, approaching even to within fifty yards at the northern side of West Point, and off several of the smaller points, notably the eastern point of Isthmus Cove. The fifty fathom curve is about half a mile from the shore, but approaches to within one fifth of a mile at the eastern point of Isthmus Cove, and at the point three miles northeastward of West Point; but southeastward of West Point it stretches off to four-fifths of a mile. In coasting along this part of the island it is well to keep outside the fifty-fathom curve. Off the southern face of the island the fifty-fathom curve ranges from two thirds of a mile to two miles off shore. The one hundred-fathom curve is generally about one to one and a half miles off shore east and west of the cove; and thence around the island it varies to three miles off shore.

Outside this curve the bottom is mostly green mud, occasionally mixed with sand, gravel, or shells, except off the northeastern face of the island, near West Point, where it is sand, or sand

White Rock, one hundred and [illegible] yards in extent and twenty-nine feet high, covered with sand and grass, lies off the eastern part of the cove and just outside the heads. From the east head it bears west W., distant half a mile, and from the western head east two-thirds north (E. N.), distant three-quarters of a mile. It is five hundred yards off the nearest shore to the southeast and divides a head off Fishermans Cove, which bears south southeast (SSE.) one-third of a mile from it. From the beach at the head of the cove it bears northeast by north (NE. by N.), distant three-quarters of a mile. The north, east, and southeast sides of the rock have very deep water close alongside, but around from the southwest, by west to southeast, there is foul ground from one hundred to one hundred and seventy yards off, with some kelp. One six-feet patch lies one hundred yards southeast SE. of the southeast part of the rock.

Bird Rock lies about [illegible] hundred yards broad off Fishermans Cove and directly on the line between White Rock and the anchorage. It is an irregularly curved reef one hundred yards broad and four hundred yards long, with the convex side in a line, with the curved side towards White Rock. It is a mere patch of kelp beneath its two principal parts, outside of which is deep water from ten to twenty fathoms, but the channel between the reef and northwest is not marked by kelp and has ten fathoms close to the reef on that line. The extreme western point lies east by south (E. by S.), distant about [illegible] from the outer western point of the cove and southwest (SW.) six hundred yards from the western point of White Rock. Its inner part lies west by south and east by north (W. by S. and E. by N.). It is [illegible] feet high and has not much [illegible]

Low Rock lies [illegible] from the outer end of Bird Rock and covers at half tide. A ripple also marks a rock awash bearing south by west [illegible] W. distant [illegible] from the west end of White Rock. It may be approached to within [illegible] of the latter rock, although there is a depth of three and a half [illegible] between them, and to the south by east [illegible] E. from this danger stretches a shoal patch, one hundred [illegible] extent, which has as little as eight feet of water upon it. Around the [illegible] and the [illegible] kelp.

The *Western Rocks* [illegible] to a good anchorage, half a mile west of the western head [illegible]. They are [illegible] and are [illegible] patches awash and sunken rocks, which is very limited in extent, [illegible] patches awash and sunken rocks west and southwest of the shoalest spot, [illegible] hundred yards [illegible] Depths of five, ten, and twelve fathoms are [illegible] hundred yards, rocky in places, however, but [illegible] bottom, between them and [illegible]. The shoalest point of rock lies south eight degrees west, N. 81 W. [illegible] miles from White Rock; south sixty-one degrees west, W. eighth N., [illegible] from Bird Rock; and north fifty-six degrees west, W. four-fifths N., [illegible] from the [illegible] of the cove. The reef is generally covered by a patch of kelp on the seaward side, but fishermen report that this is torn away [illegible] and that [illegible] rock. To vessels from the westward [illegible] kelp patch [illegible] kept close to keep clear of the shore when approaching [illegible] the [illegible] of rock to the southward.

Islands [illegible], off the western head of the harbor, are sharp, isolated peaks arising out of deep water. The first [illegible] to the northward when [illegible] twenty-six degrees east (N. 26 E. from the [illegible] of the point [illegible] Bird Rock, with deep water between this [illegible]. The second lies two hundred and [illegible] from the [illegible] and is [illegible] Kelp is found on its northwest side marked [illegible] edge of twenty fathoms between these dangers, and twenty five to thirty [illegible] outside the second.

Islands Cove and Anchorage.—Next [illegible] Islands Cove is a good anchorage [illegible] southeast winds, but very dangerous [illegible] northwest winds, as heavy squalls [illegible] preceded by a heavy swell. [illegible] into this anchorage with light [illegible] It is a mile wide between the east and [illegible] and has good [illegible] Vessels, in seeking for the anchorage, should [illegible] western head [illegible] a mile to clear the western sunken reef about [illegible]; or keep [illegible] Head and run between the rock awash and the [illegible] which forms the northern head of Fishermans Cove. Anchor in seven or eight fathoms [illegible] dark gray sand, with [illegible] house on the isthmus (1873) bearing south by west [illegible] W. and the low [illegible] about two hundred and fifty yards. In this position the two outer western points are in range, and the inner one just south

of the range, which is north thirty-eight degrees west (N. 38° W.). The eastern ... north fifty-seven degrees east (N. 57° E.). The west end of Harbor Reef bears ... anchorage north twenty degrees east (N. 20° E.), and the east end north forty-six ... east (N. 46° E.) distant one-third of a mile. White Rock is seen over the middle of ... The large, white building three hundred ... from the beach was the United States ... racks, built in 1863, and was visible from all points between north half west (N. ... northeast (NE.).

Dakin's Cove, Catalina Island.—This small cove is on the north shore of the ... two and one-quarter miles from the eastern extremity. It is half a mile broad at the entrance, ... falls back about one-quarter of a mile, where it ... edge of the 20 fathoms just outside the ... eight fathoms at the anchorage. ... cove is comparatively ... small valley running a mile to the ... The eastern point of the cove ... the western point has a high sugar-loaf ... lying close at the base of the ... steep-sloped ... point.

This a good anchorage ... weather, and a passable ... northwest weather. The bottom is ... The landing is on a ... beach and very smooth ... except ... very heavily.

There are two wells of good ... near the beach.

Fishermans Cove.—... from the prevailing ... but will experience difficulty in getting ... setting in and ... blows in flaws and eddies round ... Fishermans Cove ... is two hundred and seventy-five ... once deep; and on account ... reef and rock off its entrance is an ... all weathers. It is square ... the west; has no rocks or hidden dangers, and the ... the southwest point reaches ... the twelve-fathom line. Except ... the reaches within sixty ... the shore. The southwest point of the cove ... northeast point is the ... west termination of a narrow ... and ... feet high, with a sandy ... From the middle of the entrance to the ... Rocks ... open two widths to the ... White Rock.

There is a large, marshy pond on the ... near the south cove, but the water ... brackish. Scrub oak is obtained ... cove.

The secondary astronomical ... Geodetic Survey of 1852 ... edge of the bank, twenty-five ... from the ... west of the water course ... Isthmus Cove. From it the ... of White Rock was north ... degrees east (N. 25° E.), and to the ... of the Harbor north seventeen ... west (N. 17° W.). Its geographic position ...

...	...	...
...	...	...
...	...	...

In February, 1885, the magnetic variation ... east, with an annual increase of ...

A growth of thorny bushes covers the ... rounded, ... traveling very difficult ... is partially stocked with ... and ... time vast numbers of ... rounded, but they have helped to supply the Catalina market with fresh mutton. In 1858 ... lead mines were rediscovered, the ... lead as an ... entitlerous galena. No veins ... of the one has been found and ... operations ... suspended.

The island is distinctly visible ... from Point Loma Light-house.

A topographical survey of ... and ... by the U.S. Coast and Geodetic ... and hydrographical ... The anchorages have been published ... and ... to ... and the ... islands are well exhibited in the ... Survey chart from San Diego to Santa Monica.

Santa Catalina Island was discovered by Cabrillo on the 6th of October, 1542, and ... on the next day. It was well ... by the Indians. Ferrelo says it was ... of the two Santa Catalina and San Clemente ... on the 6th, and was named San Salvador ... the larger vessel.

It received its present name from Vizcaino, November 25, 1602, when it was thickly ... by a people reported to be very numerous, ... and ... and concealing, some ... of which accomplishments they ... Padre de la Ascension, who accom...

Sugarloaf, 250 f
Dakin's Cove, on the North side of the Eastern end of Sa

Sugarloaf, 250 feet.

rth side of the Eastern end of Santa Catalina Island, SSW., 1¼ miles.

Santa Barbara Island, S. ¼ W., 29 miles, 517 feet.

Santa Barbara Island, S. 43° W., distant 32¼ miles

S. by E., 1½ miles.

¼ mile, 180 feet.

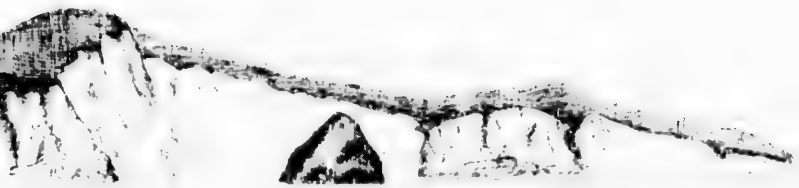
S. by W. ¼ W., ¼ mile, 517 feet
Santa Barbara Island

Santa Cruz Island, W. ¼ S., 50 miles

3° W., distant 32¼ miles

Santa Barbara Island, S. 40° W., 32 miles

Santa Barbara Island, SW. ½ S., 30 miles



y W. ½ W., ¾ mile, 517 feet.
Santa Barbara Island

SSW., 1 mile, 120 feet.

SW. by S., 1¼ miles

Santa Cruz Island

Anacapa Island, W. ½ S.

this expedition, gives very particular descriptions of a kind of temple to the sun, with images and idols, found near the two coves. Vizcaino's chart locates the circle described in their worship at the Great Depression. He also names the great bight containing the island of Catalina, the Bahia de Santa Catalina. This would apparently embrace San Pedro and Santa Monica Bays.

SANTA BARBARA ISLAND.

This is one of the only two small islands of the Santa Barbara group. It lies on the line, and very nearly half way, between the north end of San Clemente Island and the east end of Santa Cruz Island. It is visible at a distance of twenty-seven miles.

The general direction of the island is north and south, and its extreme length is one and a half miles. The width east and west is one mile. When seen from the east or west the island rises as two islets, the southern one appearing the higher. Steamers crossing the Santa Monica Bay make it out in good weather as two small flat islets on the horizon, the apparent eastern being the larger. They appear joined for a short time. There are two points half a mile westward of the eastern face of the island, which lie two-thirds of a mile from each other on a north two-thirds east and south two-thirds west (N. ⅔ E. and S. ⅔ W.) course. The southern one is five hundred and forty-seven feet above the sea, and the northern one five hundred and seventeen feet, the latter reaching that elevation in less than one hundred feet from the sea. The depression between them is four hundred and twenty feet above the sea.

The island is very bold and high on every side, and presents precipitous cliffs to the full force of the ocean swells. The bluffs are honeycombed with great caverns into which the sea breaks with a loud noise. The base of the island is a variety of basalt, while above lies a yellowish coarse sandstone covered with alluvium.

Kelp surrounds the island out to ten fathoms of water, but at irregular distances from the shore. It lies two-thirds of a mile off the southeast point of the island, and hence to the north point it averages one-quarter to one-third of a mile off shore, with five or six fathoms among it and deep water outside.

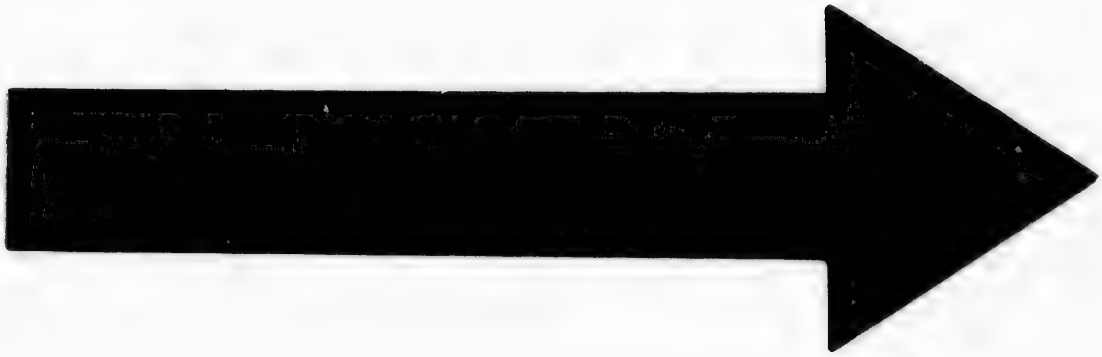
Hydrography.—The water around it is bold, except where kelp indicates a foul, rocky bottom. The fifty-fathom line lies an average of one and three-quarters miles from the shore, over a bottom of fine gray sand and broken shells.

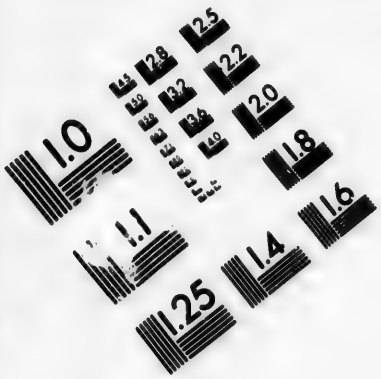
Dangers.—Off the southwest point of the island, one-third of a mile distant, is a rocky islet two hundred and fifty-seven feet high, with kelp around and beyond it. The surface slopes to the southward and has a nearly perpendicular pitch to the north. Off the western point of the island the kelp makes out over one mile, and on the outer and southern edge of this large field is a rock awash bearing north seventy-six degrees west (N. 76° W.), distant one and one-eighth miles from the highest part of the island, and south seventy-four degrees west (S. 74° W.), distant one and one-quarter miles from the northern high point of the island. It is reported that there is another rock awash in this kelp but its position is not yet determined.

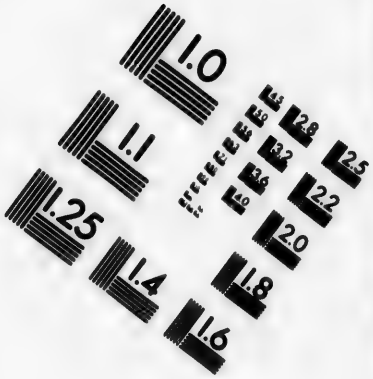
Landings and Anchorage.—Landing is at all times difficult, and can be effected at only two points. The better landing place is on the east face half a mile from the south point, and was marked by a sealer's hut on the rocks just at the landing. The anchorage off this landing is in eight fathoms of water, clean sandy bottom, not good holding ground, in a clear space just inside the outer edge of the kelp, with the sealer's hut bearing south sixty degrees west (S. 60° W.), distant one-third of a mile, the southeast point of the island bearing south twenty-two degrees west (S. 22° W.), distant two-thirds of a mile, and the northeast point north twenty-eight degrees west (N. 28° W.), distant five-sixths of a mile. The landing is very rough and rocky, and the proper course is between the two outermost rocks awash and then between others of the same character into a small opening on the north side of the rocky ledge upon which the sealer's hut is situated.

The other landing is on the north side of the western point of the island, about six hundred yards from the extreme western point, and is marked by a small shanty on the west side of a small break in the bluff. This landing is bad at times, but in April, 1871, was as good as that on the east side.

There is not a drop of water on the island; no grass, but plenty of prickly pear (*opuntia vulgaris*) and shrubs.







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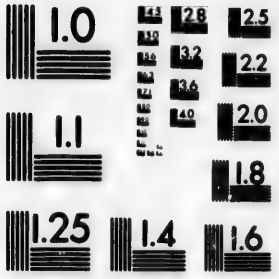
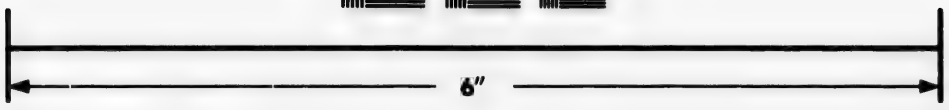
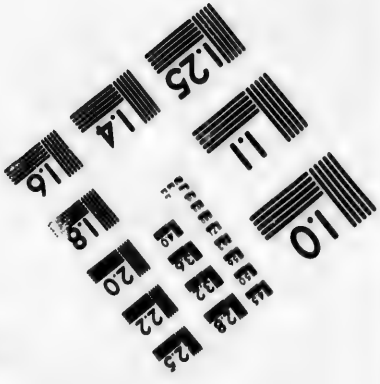





Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

The geographical position of the highest point of the island, as determined by the U. S. C... and Geodetic Survey, is:

Latitude	33°	28′	20″.8 north.
Longitude	119	02	26 .1 west.
Correction	7h	56m	08s.74

and from it the following bearings and distances to prominent objects are given:

Eastern point of Santa Cruz	N. 51	°	W., distant 42 miles.
Eastern end of Anacapa Island	N. 41	°	W., distant 36½ miles.
Hueneme Light house	N. 27		W., distant 41½ miles.
Point Firmin Light house	N. 54½		E., distant 39¾ miles
Western point of Santa Catalina Island	N. 75		E., distant 21¾ miles
West point of San Clemente Island	S. 55		E., distant 34¼ miles
East point of San Nicolas Islands	S. 39		W., distant 24¾ miles

Fifteen miles north fifteen degrees west (*N.* 15° W.) from the island of Santa Barbara... vations showed a current to be running to west by north (W. by N.) at the rate of half a n... hour. Depth of water four hundred and sixty eight fathoms over soft, muddy bottom.

Tebenkoff says that "in Slobaltschikoff's report to Baranoff he mentions the existence... banks seven miles southeast from Santa Barbara Island; but, although this observation is... bly incorrect, all doubt is not removed." This position is in the line between Santa Barba... and San Clemente Island, and these waters have not been thoroughly sounded.

Vizcaino has laid down this island and named it; but he has laid down San Nicolas clos... side of it to the westward, and quite as small in extent as Santa Barbara.

In Tebenkoff's Atlas of Charts he has Santa Barbara Island laid down as two small ... Evidently the two hills had been seen from a long distance.

ISLAND OF ANACAPA.

This island is at the eastern entrance of the Santa Barbara Channel, where it is con... to eleven miles in width. It is thus a danger to the navigation of the channel in thick weath... since the building of the light house and fog-whistle on the north shore of the channel a... Hueneme vessels endeavor to keep along under that shore.

The island is, in fact, a curiously formed narrow backbone of three rocky islands, exte... a nearly east northeast direction, their entire length being five miles. The west end of A... is a peak nine hundred and eighty feet in height, with a base of over two miles by three q... of a mile. This is separated from the middle island by a gap ten feet wide, through which ... can pass. The middle island, rising to three hundred and twenty feet elevation, is nearly tw... long by five hundred yards wide, whilst the eastern island, rising to two hundred and six... elevation, is little over a mile long by five hundred yards wide. The gap separating the ... and eastern islands is over two hundred yards wide, but so completely filled with rocks ... impassable for boats, which can, however, land on the north side of the island. The main ... is visible thirty five miles distant; but the two islets to the eastward are visible at twe... eighteen miles, when they rise as a regular wall of nearly uniform height and three miles ... viewed broadside on; but when seen at an angle they appear as a broken wall with two ... slightly inclined tops. This is because the highest part of each islet is close to the south ... with the surface sloping towards the north. The south faces are thus much more precipito... the north.

There are no outlying rocks, but several close under the shores of the eastern islands, a... large, rocky islet under the south shore of the main island.

The islands are composed of coarse, dark-gray sandstone, very rotten and crumbling ... sides are perpendicular, and from two hundred and fifty to three hundred feet high, and th... mit of the ridge for two thirds of the length, reckoned from the eastern extremity, has been ... planed, and the line of this action is marked around the flanks of the western part of the ... island, notwithstanding it is cut on the north side by several deep gulches, with almost ve... sides, running from the summit to the bluff. The whole formation is filled with innumerable ... ties, giving it the appearance of an enormous blackened honey comb. The soil is loose and ... producing only a few dwarfed species of cactus and a thick leaved, succulent plant common ... sea-coast in dry, sandy localities. Scarcely a drop of water is to be found on the island.

Arch Rock, S. ¼ E., 8 miles.

Anacapa Island, height, 930 feet.

The Eastern extremity of Anacapa Island, as seen from the Southward. (1853.)

Point Mugu.
NW. by W. ¾ W. 13½ miles.

Santa Monica Mountains.
4,300 feet high

Santa Cruz Island.

Anacapa. W. ¼ S. 26 miles.

Point Mugu.
NW. by W. ¾ W., 7 miles.

White Cliff.

La Jolla Peak.
1,56[illegible] feet.

The eastern end of the chain is known as the *Arch Rock*. It is a bold, rocky point, but, when viewed from north or south, appears to have a gentle slope from the top of this part of the island (a hundred and sixty feet above the sea) to the water. A little over half way down this slope there is a broad cleft in the wall, making Arch Rock an islet, with a high, broad, and very regular arch through it from north to south, and visible at a distance of eight or nine miles. Just south of the eastern end of the rock is an isolated, high, pyramidal rock, with seven and a half fathoms of water outside of it (see sketch). A depth of ten fathoms is found close off the east and north sides of Arch Rock, increasing to twenty five fathoms, with rocky bottom, within half a mile to the north and to the south, whilst irregular, rocky bottom is found to the eastward, with twenty fathoms at one mile distant. There is no kelp off this point.

Hydrography.—The depth of water around the island is moderately great. The forty-fathom curve lies about a mile off the eastern part of the north side of the island, approaching the west-ern part of the north side; and probably the same general distance and depth is found off the south shore. In the Anacapa Passage at the west end of the island the depth varies from twenty-eight fathoms immediately off the point to thirty fathoms in mid-channel. Off the eastern point the bottom drops to one hundred fathoms in two miles. The hydrography has not been completed off the south shore; but the indications are that the three hundred and four hundred fathom lines approach within two or three miles.

Kelp.—A compact but narrow field of kelp extends under the southern side of the island to within half a mile of each extremity, with one break abreast the western boat-passage. On the north side of the island the kelp extends from the western extremity to half a mile eastward of the western boat-passage, thereby giving some protection to it. Off the northwest face of the middle islet lie three extensive patches of kelp, which give protection to the anchorage under them.

Anchorage.—Bold water is found around the island up to the edge of the kelp. The best anchorage is one-quarter of a mile north of the middle of the middle island in eleven or twelve fathoms of water, between two large patches of kelp, with the eastern passage just open. From this anchorage there is a boat-landing lying to the south-southwest (SSW.).

There are *two anchorages* on the south side. One lies between the main body of kelp and a notch a little over a quarter of a mile south-southwest (SSW.) from the boat-passage between the middle and western islets, in eleven fathoms of water. The other is in twelve fathoms, about a quarter of a mile southeast by south one-quarter south (SE. by S. ¼ S.) from the middle of the passage between the middle and eastern islets. There are boat landings on the north side of the western and eastern extremities of the island.

Landfall.—When vessels are crossing Santa Monica Bay from the eastward they can not see Anacapa before Santa Cruz rises above the horizon, as two faint islets are seen when the vessel is fourteen miles westwardly from Point Vincente. At nineteen miles from Point Vincente, Anacapa is seen as a black speck just outside the apparent northern extremity of Santa Cruz and bearing west, distant thirty-two miles. At twenty-nine miles from Point Vincente and twenty-two from Anacapa Island, the latter is projected on Santa Cruz below the outline and between the apparent north point of Santa Cruz and the highest peak, while the faint outline of Santa Rosa Island comes up on the apparent south point of Santa Cruz, and when off Middle Point and Anacapa Island is distant twelve miles, it shows clear of the eastern point of Santa Cruz.

The geographical position of Arch Rock, at the eastern end of Anacapa Island, is:

Latitude	34°	01′	01″.6 north.
Longitude	119°	21′	21″.0 west.
Or, in time	7h	57m	25s.4

From Arch Rock we have the following bearings and distances to prominent points:

Highest point of Santa Barbara Island	S. 41° E.,	distant 36½ miles.
Point Fermin Light-house	S. 86° E.,	distant 57½ miles.
Point Dume	N. 75½° E.,	distant 28 miles.
Point Hueneme Light-house	N. 29° E.,	distant 11 miles.
San Buenaventura Wharf	N. 3° W.,	distant 15½ miles.
Santa Barbara Light-house	N. 54° W.,	distant 29¼ miles.
Point Concepcion Light-house	N. 80° W.,	distant 62 miles.

The channel between Anacapa and Santa Cruz Islands, known as the Anacapa Passage, is described on page 98.

The Superintendent of the U. S. Coast and Geodetic Survey has recommended the erec
a light house and steam fog whistle on the eastern extremity of the island.

Anacapa was a great resort for the seal, sea lion, and sea elephant, and formerly for the
but nearly all have been killed off, and the sea elephant is extinct.

It was on this island that the steamship *Winfield Scott* ran ashore during a dense fog
night, December 2, 1853, in calm weather. The vessel was steaming at full speed, and ran h
and upon the rocks with such force that she remained fast by the bow until heavy weather
her up. The course of the steamer had been taken from Point Concepcion, but without a
edge of the currents. Two hundred and fifty people were on the island eight days, and w
cued by the steamship *California*.

The island was discovered by Cabrillo in 1542, but he did not name it. In 1602 V
placed it on his chart, but comparatively too large. He named it Isla de Gente Barbuda.

Don Juan Perez, in 1774, named this the rocky islet of Santo Tomas, but it is not pla
the Carta General of 1791.

Vancouver, in his narrative, calls this island Enneeapah, and repeatedly mentions it b
name; but upon the chart of his survey and explorations it is engraved Eneeapah, wh
given rise to every variety of spelling. Old Indians pronounce it En-nee-ah pagh', with
strong guttural intonation (1850).

A chart of Anacapa and the eastern end of Santa Cruz was published by the Coast Sur
1856, and a preliminary map, showing its relation to the mainland, in 1857. Since then th
plete chart of the Santa Barbara Channel has been published (1882).

THE ISLAND OF SANTA CRUZ.

This island is the largest of the Santa Barbara Channel group, and lies broad off the
abreast the town of Santa Barbara, at a distance of twenty-one miles. Its general direc
east and west, with a length of twenty-one miles and an average width of four miles, wh
extent of its shore-line is not less than sixty miles. Its eastern part is extremely irregular
ren, and destitute of water, and the surface of the northeastern part is thickly strewn with
angular pieces of stone, broken as if with a hammer. Several species of cactus and some
coarse grasses flourish.

The shores of the island are for the most part very bold and jagged, exhibiting coarse
gray sandstone, crumbling and rotten, like that at Anacapa. The summit of the eastern
a cross ridge running northwest by west (NW. by W.) and lying three miles from the e
point. The elevation of the highest part of this head is fifteen hundred and twenty feet,
visible from a distance of forty miles. The eastern extremity of the island is named *Sa
Point*, and lies four miles west from Anacapa. It is a comparatively low table, with deep
close under it, and the anchorages of Smugglers Cove on the south and East End on the
It is in latitude 34° 01′ 55″ north and longitude 119° 31′ 15″ west. The Devil's Peak is in l
34° 01′ 39″ north and longitude 119° 47′ 07″ west.

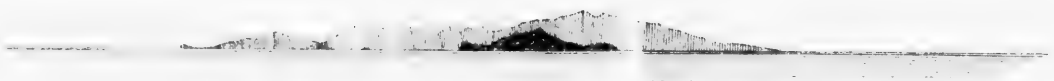
Two and two thirds miles west by north half north (W. by N. ½ N.) from San Pedro Po
high, rocky point named *Cavern Point*.

From the transverse eastern ridge another runs nearly east and west through the axis
narrow part of the island, very nearly to the middle; and then the two great ridges, one
north side and one on the south side, run to the western end of the island.

Diablo Point.—From Prisoners Harbor to the west end of the island the shore-line is
a large number of cañadas, worn down through the high mountain flanks. Between the c
are the transverse ridges, which form as many bold, high points, but none prominently bu
the general curve of the shore except Diablo Point, which comes down as two high ridges a
out nearly half a mile beyond the others. It is situated nine and three-quarters miles sou
enty seven and a half degrees west (S. 77½° W.) from Cavern Point, and eight miles north
four degrees east (N. 84° E.) from West Point. There is very deep water close under it.

West Point and *Frazer Point.*—The northwestern extremity of the island is the abrupt
nation of the previously mentioned high ridge running near, and parallel with, the northern
and gradually decreasing from twenty-four hundred and nine feet, which is the elevation of
Peak, the highest point on the island, to seven hundred and twenty feet. The highest p
just visible above the horizon fifty-five miles from seaward. This northwestern cape present
the northwest the appearance of two terraces. The lower one is forty feet above the sea, an

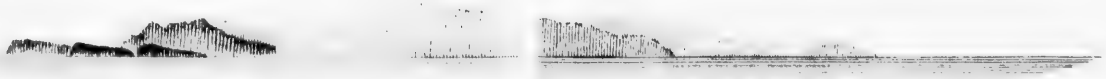
Santa Rosa Island. Santa Cruz Island. Anacapa Island, W. by S., 26 miles.



Santa Rosa Island,
W. by S. ½ S., 57 miles.

Anacapa Island,
W. by S. ½ S., 22 miles, 930 feet.

Santa Cruz Island.



Anacapa Island,
SW. by W. ½ W., 17 miles, 930 feet.

Santa Cruz Island (East end),
height, 2,407 feet.

West end, W. by S. ½ S., 40 miles.

cond is three hundred and twenty feet. Along the northern face for three or four miles from the western point the shore is a very precipitous bluff, two hundred and twenty feet high, with a narrow terrace between it and the high ridge immediately behind.

This northwestern extremity of the island is one and one-quarter miles broad, north by east and south by west, and its northern angle is named *West Point*. Its southern angle lies about a mile and a half southward of West Point, and is a low, projecting point called *Frazer Point*. To the eastward and southward of the latter is a small bight forming Forney's Cove or Northwest Anchorage, elsewhere described.

From Frazer Point the farthest part of the broad southwest shore of the island bears southeast (SE.) distant five and a half miles, with a deep bight of nearly two miles between, upon which opens the Cañada Cervada.

West Point is in latitude 34° 04′ 25″ north, and longitude 119° 55′ 00″ west.

The southern shore of the island has much the same general characteristics as the northern, except that it is not so much indented. Its principal direction is west southwest and east northeast for sixteen miles. The main ridge recedes from the coast towards the southwestern part of the island, and thus the arroyos coming upon the coast-line are longer and perhaps deeper. This southern ridge has two high points in its length: Ragged Mountain, thirteen hundred and thirty-one feet high, in latitude 34° 59′ 15″ north, and longitude 119° 49′ 17″ west; and Center Mountain, thirteen hundred and seventy-six feet high, in latitude 33° 59′ 36″ north, and longitude 119° 45′ 14″ west.

The southern shore-line has many high, precipitous heads, but none projecting very prominently outside the general trend. There are a few small indentations that afford anchorages for small craft. Off the western part of this south shore lies Gull Island, the only real danger around the island, elsewhere described.

When a vessel is off Point Laguna on the mainland the eastern end of Santa Cruz Island shows white in the morning light.

The *Hydrography*.—The island is a great landmark in coming from the southward, and has bold water close under its shores. There are no outlying dangers except the Gull Island patch under the southern shore near the Santa Cruz Channel. The two-hundred fathom line is only two and a half miles from the south side of the island with a bottom of green sand, green mud, and coarse gravel. The fifty fathom line averages one and a half miles from shore over fine gray sand and broken shells. But close under Gull Island, within less than a mile, is a deep *submarine valley* carrying four hundred and thirty fathoms, and reaching into the Santa Cruz Channel parallel with the southwest shore of the island, with over one hundred fathoms. In this deep valley appears a fifty fathom bank one and a half miles south from Gull Island.

On the north side of the island the fifty-fathom curve averages two and a half miles from shore, and the one-hundred fathom curve about three miles.

Kelp.—There is less kelp around this large island than around any of the others. The recent chart of Santa Barbara Channel, published by the Coast and Geodetic Survey, gives its details, which are not easily localized in description, except the larger fields. A moderately large field extends off the southwest part of the island for one mile, to include Gull Island, with deep water, fifteen to twenty-five fathoms, close around it. Towards the northwest this field narrows to a close inshore line of kelp around the southwest and west sides of the island for nine miles to Forneys Cove under Fraser Point. At the narrowest part of the Santa Cruz Channel a line from this kelp stretches out two-thirds of a mile, embracing broken bottom in six and a half fathoms. For seven miles eastward of the Gull Island patch there is no kelp laid down, but at Valley Anchorage a narrow border begins and continues to the southeast point of the island, increasing in width to three quarters of a mile off the Shaw Anchorage, and bordered by depths of from twenty to nine fathoms. It ends at the southern part of Smugglers Cove, seven miles from Valley Anchorage; but at the northern entrance of that cove, and thence one mile to and around the eastern end of the island for two miles, a narrow line of kelp skirts the shore, with fifteen to twenty-five fathoms close up to it. Along the whole northern shore the kelp line is broken up in short stretches very close inshore, and bordered by depths of from ten to twenty fathoms of water.

Dangers.—No hidden dangers have been developed under the north shore, and only one under the south shore, known as Gull Island.

Gull Island.—This danger is a small cluster of outlying islets, one quarter of a mile in extent, lying nearly three-quarters of a mile from shore, south of the southernmost part of the island,

fourteen miles west-southwest (WSW.) from Shaw Anchorage and three miles from the south... point. The largest and outermost of these rocky islets is known as Gull Island and its est... height above the sea is one hundred and fifty feet.

The geographical position of the southwest summit of Gull Island is:

Latitude	33°	56′	54″ north.
Longitude	119°	49′	36″ west.

A field of kelp coming around the southwest point of the island gradually stretches off ... until it surrounds Gull Island, ending one mile to the eastward of it. Foul bottom is fou... mediately surrounding the visible rocks, and between them and the shore from eight to thr... a quarter fathoms are laid down. Outside of Gull Island the water deepens rapidly to tw... eight fathoms in less than half a mile, and in one mile to between two hundred and three hu... fathoms, being part of the narrow submarine valley described above, which makes in fro... southeastward along the southwest shore of Santa Cruz Island.

Harbors and Anchorages.—The shores of the island are indented by several small bay... numerous little coves, which afford anchorage to small craft trading or seeking shelter from s... winds.

Prisoners Harbor.—On the northern shore of the island, and beginning just east of the ... of it, the shore makes a moderately deep curve to the southward and eastward, and then s... round to the northward for two miles under the eastern head, forming a broad, open road... The length of this bight is about four and a half miles and its depth two miles. Formerly ... all called Prisoners Harbor, but this name is now restricted to one anchorage only, as there a... other anchorages in it. The bight is broad open to the north, and the eastern and west... ing sides are very high and rugged as well as the great ridge on the south. The soundings ... approaches are bold, and a depth of fifty fathoms is found two and a half to three miles off ... but approaching within one and a half miles off the northeast shore over a bottom of fine ... sand, mud, and broken shells. The forty-fathom curve lies from one-half to one mile off ... and ten fathoms can be carried close in shore. The kelp extends to the depth of twent... fathoms immediately off Prisoners Harbor and no hidden dangers have been developed in it.

The sand beach has small trees or shrubs (Malva), with pine trees on the western side ... harbor, and none to the eastward.

The anchorage lies in the southwestern angle of this broad bight and has a field of kel... and a half miles long directly in front of it, and reaching half a mile outside the deepest p... the cove. It is eight miles from the eastern point of the island, and in approaching the a... age from a distance it can be made by steering for the lowest point in the ridge of hills ... traverses the island from east to west. Anchor on the range of the wharf and the cottage ... abreast of the large white rock on the west side of the bight in ten to fifteen fathoms; ... bottom. A buoy lies off the end of the wharf with moorings suitable for schooners or ... steamers. The anchorage is an excellent refuge in southeast weather, and for moderate we... weather, but there is no protection from the heavy swell setting in with a strong northwest... is dangerous in a northeast wind which, however, is rare. The depth of water at the end ... wharf is between fifteen and sixteen feet.

From Prisoners Harbor the Santa Barbara Light bears north twenty-one degrees west ... W.), distant twenty one miles.

The Point Hueneme Light bears north fifty-nine degrees east (N. 59° E.), distant twent... and three-quarters miles, but not open until you are half a mile outside the kelp, as the ... one and one-quarter miles inside Cavern Point cuts it off.

The Coast and Geodetic Survey secondary astronomical station was on the eastern side ... fresh-water stream emptying into Prisoners Harbor. Its geographical position is:

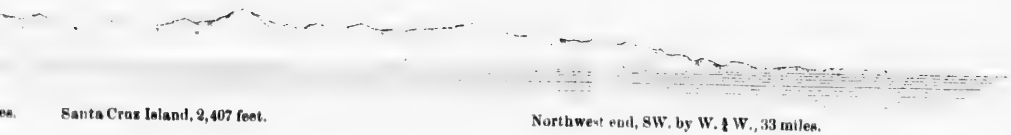
Latitude	34°	01′	09.8″ north.
Longitude	119°	40′	00″ west.
Or, in time	7h	58m	40s

Chinese Harbor.—In the Prisoners Harbor bight, in the deepest part of its southeastern ... and two and a half miles east of Prisoners Harbor, is a landing known as Chinese Harbor ... three-fathom line is moderately well out and there are rocks within that depth. It is repo... be a good southeast lee, and has fresh water three-quarters of a mile to the eastward. A ... in the mass of kelp in five or five and a half fathoms. Cochie Point will bear north twent... degrees east (N. 29° E.), distant two miles.

Southeast est end, SW. by W. ½ W., 33 miles.

Southeast end, 1,421 feet, SW. ¼ S., 17 miles. Prisoner's Harbor, SW. ¼ W., 23 miles. Santa Cruz Island, 2,407 f

Prisoner's Harbor, Santa Cruz Island, SE., 2 miles.



es. Santa Cruz Island, 2,407 feet. Northwest end, SW. by W. ½ W., 33 miles.

anta Cruz Island, SE., 2 miles.

Pelican Bay is at the westernmost part of the Prisoners Harbor bight, and one and one-eighth miles northwest by west (NW. by W.) from Prisoners Harbor. The western tail of the kelp field just reaches here. The cove is a very small indentation of the high shore, and it is an open roadstead. Anchor in kelp in six fathoms.

Tyler Cove, five and a half miles north sixty degrees east (N. 60° E.) from Prisoners Harbor, is a snug little anchorage for small craft except in northwest winds. It lies on the northwest shore of the eastern head, and about half way between Cochie Point and Cavern Point.

Scorpion Harbor or *East End Anchorage* is an open roadstead two miles west of the eastern end of the island and three quarters of a mile east of Cavern Point.

This anchorage lies off the mouth of a straight, deep cañon opening to the northeast on the north face of the eastern head of the island. Two rocks, just to the eastward, mark the locality. This cañon serves to mark the place from a distance, as it is the first break in a long line of cliffs which extend southwestward for several miles towards Prisoners Harbor. One quarter of a mile westward the land juts out in a bold promontory which forms the natural shelter of this anchorage against northwest winds. One-quarter of a mile to the eastward and two hundred yards off shore there is a large and well marked islet. Round Rock, which is smaller and about the same distance from shore, is in plain sight in the anchorage. Keep to the westward of it in entering and leaving, and anchor to the northwest of it in five to six fathoms, over sandy bottom. Water can be had from a well near a house in the cañon.

There is no shelter from this anchorage round the east point of the island to Smugglers Cove.

There are several other shelters, more or less useful for small craft, on the north side of the island to the westward of Prisoners Harbor and Pelican Bay. The principal of these shelters are:

Tinker Harbor, two miles west of Prisoners Harbor; good for small craft, except in north winds. A high ridge comes down on its west side with a rock off the high point. A patch of kelp close in shore runs hence one mile west to Platts Harbor.

Platts Harbor, three miles west of Prisoners Harbor, a rather large cove with rocks off the east head. There is kelp to the east and west. It is a southeast lee, and has fresh water.

Point Diablo Anchorage, about four miles west of Prisoners Harbor and just east of Point Diablo. It is small but affords good anchorage for small craft in all winds except from the northeast.

A *boat landing*, one and a half miles westward of Diablo Point.

There are several anchorages on the south side of the island, good for small craft during northwest weather, and they are located as follows, beginning at the eastern end:

Smugglers Cove.—This anchorage lies one and one-quarter miles southwest (SW.) from the easternmost point of the island. It is a broad opening of five-eighths of a mile where the shore retreats one-quarter of a mile, forming a large open bight with sand beach. The kelp is heavy and thick on the northeast of the bight, and extends one quarter of a mile off shore, whilst a large patch exists at the southwest point. The approaches for a mile are in fifteen fathoms water, decreasing very gradually to five fathoms. It is a partial lee in northwest winds and has fresh water.

This Smugglers Cove must not be confounded with the Pyramid or Smugglers Cove of San Clemente Island.

Shaw Anchorage.—One mile off the southeastern point of the island and three miles south-southeast (SSE.) from the easternmost point, an anchorage is laid down on recent Coast Survey charts in nine fathoms over a bottom of broken shells. In this position the east end of the island bears north by east (N. by E.), distant three and three-quarters miles, and the west end of Anacapa bears northeast by east (NE. by E.), distant five and a half miles. Small craft can anchor nearer the point in the kelp, which stretches off shore in a heavy field from one-half to nearly one mile for a distance of three miles around the southeastern point of the island.

Valley Anchorage lies five and a half miles from the southeast point, on Shaw Anchorage. It is in the deepest part of the long curving of the shore to the northwest between the Shaw Anchorage and the middle of the south shore of the island. The western tail of the kelp-line from Smugglers Cove ends here.

Albert Anchorage and *Cochies Prietos Anchorage* are both small, the former on the east and the latter on the west side of *Scandal Point*, which is a small, sharp, jutting point about midway on the south shore of the island, seven and a half miles from its southeast, and eight and a half from

its southwest point. A larger and bolder point lies one mile southwest half west (SW. ½ W.) from Scandal Point, but it has no name. Both these anchorages are broad open to the southeast.

Alamos Anchorage.—On the southeast face of Santa Cruz Island, two thirds of the distance from the eastern point, and three and one-half miles east northeast from Gull Island, there is a slight indentation in the shore line at the mouth of a deep canada, which makes out from the northwest. A high, rounding head forms the southwest side of the indentation; the east side is marked by two moderately high rocks, which seen from the southward look like a large hay-stack. From the rocks to the western shore the distance is about two hundred yards. The beach on the inner side of the cove is fine sand, and in ordinary northwest weather the water is very smooth and the landing for boats is good.

It is reckoned a passable anchorage for small craft. It lies two and a quarter miles west northwest from the anchorage of Cochies Prietos, and two and two thirds miles west of Scandal Point.

The high point, one and a half miles to the east northeast, is the seaward base of Sur Peak, which is twelve hundred feet high at only half a mile inland.

Posa Anchorage lies just east of and under the southwest point of the island, and at the east entrance to the Santa Cruz Channel. It is off the mouth of a long, broad arroyo coming from the northeast. There is kelp here and rather foul bottom. It is broad open to the southeast. From this anchorage Gull Island bears east southeast (ESE.), distant two and a half miles.

Forney's Cove lies under the south shore of the western extremity of the island, with the high ridge one mile to the north. This end of the island, being about one and a half miles broad, has two points—West Point, which is the northwestern point and quite bold, and Fraser Point, which is a low point stretching in to the northeastern part of the entrance to the Santa Cruz Channel. About one mile east of this point, in a receding of the shore line, is Forney's Cove, where vessels lie in safety from all northerly winds. There is a heavy surf on the beach, but at the anchorage the swell is broken by a rocky islet almost fifty feet high, and connected with the shore by a reef of smaller rocks. Anchor in five fathoms, with the southernmost of these rocky islets bearing southwest (SW.), distant one eighth of a mile. From this low, projecting point the broad northwestern part of the island lies southeast, and its farthest point, near Posa Anchorage, is distant one and a half miles distant.

From San Pedro Point, at the eastern extremity of Santa Cruz Island, the Santa Barbara Light-house bears northwest half north (NW. ½ N.), distant twenty four miles, and Point Hueneme Light-house bears northeast two thirds east (NE. ⅔ E.), distant seventeen miles.

From West Point, the western extremity of the island, the Santa Barbara Light house bears north thirteen degrees east (N. 13° E.), distant twenty-one and a half miles, and Point Conception Light-house bears north sixty-five and a half degrees west (N. 65½° W.), distant thirty-five miles.

The Anacapa Passage lies between the eastern end of the island and Anacapa, and is described on page 98. The Santa Cruz Channel lies between the southwest face of the island and the northeast face of Santa Rosa, and is described on pages 98 and 99.

Tides at Prisoners Harbor.—The Corrected Establishment, or mean interval between the passage of the moon's transit and the time of high water, is 1ᵏ 05ᵐ; the mean rise and fall of the tide is three and six-tenths feet, of spring tides six feet, and of neap tides one and three tenths feet; the average duration of the rise is 5ʰ 36ᵐ, of the fall 5ʰ 26ᵐ, and the stand 0ʰ 46ᵐ; the average difference in the heights of the morning and afternoon tides of the same day is one and two tenths feet for the high waters and one and eight-tenths feet for the low waters; the average difference of the highest high and lowest low waters of the same day is five and one-half feet and the greatest difference is seven feet.

To obtain the times and heights of each high and low water, first take from the Tide Tables for the Pacific Coast the times and heights for San Diego, and then to obtain the time of high water subtract four minutes, and to obtain the time of low water subtract eight minutes; to obtain the height of high water subtract three-tenths of a foot, and the height of low water the same as at San Diego.

The latest chart of the island is the Santa Barbara Channel sheet of 1882, published by the Coast and Geodetic Survey, in which all the details of topography and hydrography are given.

This island was discovered in 1542 by Cabrillo, who named it, conjointly with Santa Rosa, the Islands of San Lucas. After his death Ferrelo visited the island and named it San Salvador, apparently forgetting that Santa Catalina had been so named by his predecessor. The Indian name was Limu, or Limun, and there were eight Indian villages upon it.

In 1602 it was named Isla de S. Ambrosio by Vizcaino.

The island received its present name from Don Juan Perez on the 6th of March, 1774, when in the frigate *Santiago*, and is described by him as the largest and highest of the group, and inhabited by Indians.

ISLAND OF SANTA ROSA.

This is the third island of the group directly off the coast of Santa Barbara and parallel therewith. It is a good landfall, being visible from a distance of forty-four miles. The outline of the island is bold, and although not so high as Santa Cruz it exhibits moderately rounded hilltops extending the whole length of the island and rising over one thousand feet, the greatest elevation being fifteen hundred and sixty four feet above the sea. There are no large trees on the island, but it is well watered and covered with grass and herbage. Scrub oaks and pines in small clumps are found in the gulches and on the south slope of the hills. The shores are bold, rocky, and high, with the exception of Channel or Skunk Point, which lies two and a half miles northwest (NW.) from the extreme eastern point of the island.

The general shape of the island is that of a parallelogram with the direction of the longer diagonal east and west, and its length fourteen and a half miles. The shorter diagonal is nine and one-third miles long and lies north nine degrees east and south nine degrees west (N. 9° E. and S. 9° W.). The northwest side is a slightly indented shore-line of ten and a half miles south sixty-five degrees west and north sixty-five degrees east (S. 65° W. and N. 65° E.). Along this side there is a plateau rising gradually from the edge of the bluff to the foot of the mountains. It is three hundred and forty feet above the sea and cut by numbers of deep, sharp gulches which make down from the mountains to the sea. Many of these contain never-failing streams of clear water. The southwestern side of the island is nearly straight, and nine and a half miles long north fifty-five degrees west and south fifty-five degrees east (N. 55° W. and S. 55° E.). The south side is seven miles long, nearly straight, with bold, high bluffs cut by deep, sharp, irregular gulches. The area of the island is about one hundred square statute miles.

Hydrography.—The water around this island is not so bold as around the other islands. The depth ranges from fourteen to thirty-six fathoms within a distance of two miles, and the fifty-fathom line is nearly four miles from the north shore and five miles from the southeast face. Off the South Point it comes within a mile of the shore, and the one-hundred-fathom curve is only two and a half miles off. The general character of the bottom is fine gray sand, broken shells, and green mud.

In the Santa Cruz Channel, to the east of the island, the depth ranges from twenty to thirty fathoms over gray sand and broken shells, except at the southern entrance, where the head of a submarine valley penetrates the channel. In the depths of this valley the bottom is green mud.

In the San Miguel Passage, to the west of the island, the depth ranges from fifteen to twenty fathoms over fine gray sand and broken shells.

Kelp.—The greater part of the shore of this island is bounded by kelp. Becher Bay, lying between Carrington Point and Channel Point, has a compact line of it two miles long and one-third of a mile broad, with a small patch off the north point of the Southeast Anchorage. Beacon Reef, north of Carrington Point, has none; but Rodes Reef, three and one-third miles to west-southwest (WSW.) of Carrington Point, has a small patch outside of it. Three-quarters of a mile westwardly from Brockway Point a very compact field of kelp, one mile in breadth, begins and runs five miles to Sandy Point, with four to eight fathoms through it, except at Talcott's Shoal; and outside of this field, two and three-quarters miles north-northeast (NNE.) from Sandy Point and four miles west half south (W. ½ S.) from Brockway Point, is a detached field one and one-quarter miles long by one-third of a mile broad, parallel with the shore-field. No danger is laid down in this outlying field. Outside Sandy Point the kelp stretches nearly half a mile into the San Miguel Passage to thirteen and fifteen fathoms of water, sweeping thence around the southwest face of the island for nine and one-third miles to South Point, where it is close under the shore, and thence continuing close under the shore six and a half miles towards East Point. Off the lower part of the southwest face, from Sandy Point southeastwardly for six miles, the outside of the kelp line lies a mile off shore to ten and fifteen fathoms of water, with the Bee Rock and Reef within its limits. Thence for three and a half miles to South Point the kelp keeps close under the shore with six to ten fathoms of water along its outer edge. From South Point to within two miles of East Point the kelp continues close under the shore in from five to eight fathoms of water.

Johnsons Lee is inside this kelp line at its broadest part one mile east of South Point. O
Point the kelp is straggling for three-quarters of a mile, and has a sixteen-foot ledge in it
ern limit, nearly half a mile off shore and two thirds of a mile from East Point.

Sandy Point.—The western point of the island, known as Sandy Point, lies north seven
degrees east (N. 78° E.) from the eastern point of San Miguel, with the San Miguel Passa
miles wide, between them. Sandy Point is moderately bold and rocky, with detached ro
off it, and sand dunes, reaching four hundred feet elevation, covering one or two squar
inland. These white sand dunes are a marked feature of this point when coming from the
ward. Deep water, from ten to fifteen fathoms, is found off the point outside the kelp lin
is within a quarter of a mile of the extremity of the land. Inside the kelp line there is
ground. The geographical position of this point is, latitude 34° 00′ 05″ north, longitude
00″ west.

The *South Point*, so named on the chart, is broad and rounding, with a bluff face one
feet above the sea, and rises to four hundred and sixty feet elevation within two hundred
yards. On its south and westerly face it is marked by half a mile of sliding bluffs seve
dred feet high. There is a fringe of kelp close under the cliffs, but deep water outside o
geographical position is, latitude 3 53′ 30″ north, longitude 120 07′ 12″ west.

Carrington Point, the north point of the island, is three quarters of a mile broad towa
north, bold and rocky, and rises to four hundred and forty feet elevation within a mile
south seventy-one degrees west (S. 71° W.), six and three-quarters miles from West Po
northwestern point of Santa Cruz Island. It forms the northwest point of the north entr
the Santa Cruz Channel, which lies between this and Santa Cruz Islands. There is rocky
along the north face of Carrington Point, with Beacon Reef lying north by west one quart
(N. by W. ½ W.) one third of a mile distant. The geographical position of the point is,
34° 02′ 03″ north, longitude 120 02′ 32″ west.

One half mile southward of Carrington Point is a small, jutting point called *Coyot*
where broken patches of kelp begin and run into the Five Mile Bight or Becher Bay.
good water close under the point, but rocky bottom in the kelp.

Channel or *Skunk Point*, lying two and a half miles northwestward from the eastern e
of the island, is low and formed by drifting sand, with a short sand beach to the westw
nearly two miles of sand beach to the southeastward towards East Point. The sand dun
two hundred and fifty feet elevation with a low neck behind them. A few rocks lie off
inside the three fathom line. There is no kelp off this point, but moderately deep water
the sand beach.

This point contracts the Santa Cruz Channel to five miles, and the head of the s
valley is in mid channel just abreast it.

East Point is the eastern extremity of the island. It is moderately high, sharp, a
with very deep water on its east and south faces. A slight line of kelp stretches to
from the point for nearly a mile, and has a sixteen foot rock within its extremity bear
three-quarters west (N. ¾ W.) from the point.

Nearly one mile south by east three-quarters east (S. by E. ¾ E.) from East Point lie
fathom patch, with bottom of broken shells and coarse sand. The soundings around it ar
fathoms on the outside and fifteen fathoms towards the shore.

East Point forms the southwestern head of the southern entrance to the Santa Cruz
The geographical position of the point is latitude 33 56′ 28″ north, longitude 120 01

Brockway Point.—This is the rounding point on the northwest side of the island,
way between Sandy Point and Carrington Point. The shore retreats about a mile in the
of either bight on the east-northeast and west southwest. The point is high and bold,
fathoms of water within one-third of a mile of it, and the kelp field hence around San
begins two-thirds of a mile to the west by south (W. by S.) of it.

Dangers.—There are a few dangers around Santa Rosa Island, but none lying far o
They are as follows:

Beacon Reef.—The outer breaker of Beacon Reef is three eighths of a mile to the no
of Carrington Point, and the reef has from three to four fathoms of water upon it, with
seven fathoms inside and six to thirteen just outside, but there are patches on the reef
only ten to fifteen feet of water with gravelly and rocky bottom. The reef rarely breaks
is no safe passage on the inside of it. Coming out of the Santa Cruz Channel, bound n

not steer to the westward until the high land at the northwest end of Santa Rosa is open one point to the right of Brockway Point. In steering to eastward along the north shore of Santa Rosa to enter the Santa Cruz Channel, do not steer to the southward until the houses at Becher Bay are open one point to the left of Coyote Point, which is one-half of a mile south-southeast from Carrington Point.

Beacon Reef is shown on a chart dated 1848 as a rock above water with some sunken rocks around it, but the whole reef is below water.

Rodes Reef.—This is a small rocky kelp-patch seven-eighths of a mile off shore, about three miles west southwest (WSW.) from the western side of Carrington Point, one and a half miles northeast by east (NE. by E.) from Brockway Point, and a third of a mile outside the range of those points. Three sunken rocks form the danger, and they lie in a northwest and southeast direction about one hundred yards apart. They break in almost all weathers. The depths inside the kelp range from ten to five and a quarter fathoms. The danger may be safely passed on the outside in ten fathoms and on the inside in seven to eight fathoms. The kelp trails for nearly a mile to the west-northwest of the reef. When the break on the rocks is not visible in thick weather it will be well to keep a depth of twenty fathoms in steering along this shore.

Talcott Shoal.—This is a dangerous shoal, having as little as eleven feet of water upon it, and lies one and a half miles north half east (N. ½ E. from Sandy Point. The bottom is rocky, with occasional specimens of red and white coral. It is reported that there is no kelp on this shoal, and no breakers except in very heavy weather, but the chart indicates that the shoal is just inside the kelp line. The depths in the vicinity range from seven to ten fathoms of water on all sides, with irregular rocky bottom. The chart gives one sounding of four and a half fathoms outside the kelp line and half a mile north-northeast (NNE.) of the shoal. The following bearings and distances locate the center of the shoal: The north point of San Miguel Island west by north (W. by N.) eight and a quarter miles; outermost rock off Sandy Point, known as "*The Finder*," south by west half west (S. by W. ½ W.) one and a half miles; Brockway Point east by north three-eighths north (E. by N. ⅜ N.) five miles; eastern point of San Miguel Island west by south three quarters south (W. by S. ¾ S.) four and a quarter miles.

To the northward of this shoal, and one mile distant, a body of kelp extends one and a quarter miles in an east-northeast direction, parallel with the shore kelp, with twelve to fifteen fathoms of water in and around it, and may serve as a warning in thick weather when the shore is obscured. It has been elsewhere referred to.

Bee Rock lies off the southwest face of Santa Rosa, about one-third the distance from Sandy Point to South Point, and is seven-eighths of a mile from shore. It is low, and in ordinary weather is not visible from deck at a distance of four miles. The thick kelp field surrounds this danger and lies well outside of it. One-quarter of a mile west by north (W. by N.) from Bee Rock is a dangerous sunken reef, upon which a breaker is rarely seen. Vessels should not approach Bee Rock nearer than a depth of twenty to twenty-five fathoms. Keep outside the kelp to avoid this danger.

There are *several dangers* inside the large kelp field between Sandy Point and South Point, but especially where the kelp makes out a mile from shore. As there are no anchorages under this shore there is no necessity for a vessel going into the kelp.

East Point *danger.*—In the kelp which borders the shore line northwestward of East Point for nearly one mile there is a sixteen-foot rock bearing north three-quarters west (N. ¾ W.) two-thirds of a mile from the point.

The *current* on the north side of Santa Rosa Island sets about one mile an hour to the eastward with the prevailing northwest winds, but when they cease or become light the current sets to the westward about one and a half miles an hour. North of Sandy Point and about the Talcott Shoal the currents are uncertain, but frequently strong. (See remarks on San Miguel Passage.)

ANCHORAGES

Becher Bay.—There are no harbors around Santa Rosa Island. Between Channel or Skunk Point and Carrington Point there is a semi-circular bay known as the Five Mile Bight, or Becher Bay, four and one-third miles wide and one and a third miles deep, with a broad beach under a low table bluff that is about thirty feet high and three hundred yards wide.

Northwest Anchorage.—In this bight there is a passable anchorage in from six to ten fathoms of water, over rocky bottom, within one-third of a mile of the shore abreast of a wharf, at the end

of which sixteen feet of water is reported. This wharf, constructed in 1873, lies about o
two thirds miles from Carrington Point and a little over one mile from Coyote Point. It is
by the ranch houses behind it on the north side of the arroyo. Vessels usually anchor
off the wharf in six or seven fathoms water. This anchorage lies southwest one quarte
(SW. ¼ S.) seven and a half miles from the West Point on Santa Cruz Island, with Channe
bearing east by south (E. by S.) three and two thirds miles. Small patches of kelp lie
this bight. The stretch of shore for one mile from the wharf northward towards Coyote
was called Becher Bay. It is now known as the Northwest Anchorage.

Southeast Anchorage.—In the southeastern part of the Five Mile Bight, and about one
half miles west by south (W. by S.) from Channel Point, a two-hundred-ton brig anchore
fathoms and rode out a southeast gale in January, 1873.

During summer months small vessels anchor under the southeast shore of the islan
four and one-quarter miles southwestwardly of East Point, and three and three-quarter
northeastwardly from South Point. They run in among the narrow border of kelp and a
five or six fathoms. There are three small jutting points here, and the anchorage is to the
east of the southern one.

Johnson's Lee.—Vessels also anchor at this open roadstead, about one and a quarter miles
eastward of South Point, in from five to seven fathoms of water in the kelp, which is here
half a mile broad. The bight is one and a half miles long, formed by a slight retreating
high shore, and is open to southerly winds and swell, but is an excellent shelter in winds
west round by north to northeast.

The South Point is a high, bold promontory and serves to mark this anchorage at a d
When entering the bight a low, black rock, with a central peak, named *Slay Rock*, is to
served. Bring it to bear between west-northwest and north-northwest (WNW. and NN
anchor in five to nine fathoms over sand, choosing a berth without fear of the kelp, in whic
are no discovered dangers. The bottom to the westward of Slay Rock is rocky in pla
dangerous to ground tackle. Anchor well out, so as to allow sailing inshore with eddy
when the northwester is strong. There is fresh water here.

Sandy Point Anchorage.—Close under the south side of West or Sandy Point small s
of twenty or thirty tons anchor in summer, but a thorough local knowledge is necessary to
the outlying rocks.

Good *boat landings* may be found around the island every four or five miles.

The geographical position of Sandy Point has been determined by the Coast and G
Survey. It is:

Latitude	34	00	05	north
Longitude	120	15	09	west
Or, in time	8	01	00·6	

The geographical position of Mt Soledad, the highest point of the island, fifteen hund
sixty-seven feet above the sea, is:

Latitude	33	56	57	north
Longitude	120	05	23	west

It is visible forty five miles from seaward.

The computed magnetic variation for January 1, 1885, was 15° 03′ east and decreas
ally 1′.2.

The Tides at Becher Bay.—The Corrected Establishment or mean interval between the
the moon's transit and the time of High Water is 1ʰ 09ᵐ. The mean rise and fall of
three and two-tenths feet; of the spring tides, five and eight-tenths feet; of neap tides,
of a foot. The average duration of the rise is 6ʰ 36ᵐ; of the fall, 4ʰ 26ᵐ; and of the stan
The average difference of the highest high and lowest low waters of the same day
three-tenths feet, and the greatest difference seven and a half feet.

The times of high and low waters are ten minutes earlier than the tables give for S
and the heights nearly the same.

Many of the peaks on the south side of Santa Rosa Island are covered with fos
Indian mounds covered with mortars, pestles, arrow-heads, and other ancient curio
scattered over the island. The large number of the mounds, burial places, and human
that are to be found here afford evidence that the island was once thickly inhabited. T

is reported capable of sustaining ten thousand head of stock, and at present is well stocked with sheep and horses.

Cabrillo discovered this island in 1542 when coasting under the mainland, and named this and Santa Cruz the Islands of San Lucas. After Ferrelo visited them he named them individually in 1543, calling this one San Salvador, "which is the middle one." The Indian name was Nicalque, and there were three villages upon it.

In 1602 it is named the Isla de Cleto on the chart of Vizcaino, but he did not visit the island.

On the 6th of March, 1774, Don Juan Perez, in the frigate *Santiago*, named this island Santa Margnerita, and designated it as the middle one of the group, leaving out Anacapa, which he called the rocky islet of San Tomas. On the Carta General of 1791 it is designated San Miguel, and on other Spanish charts Santa Rosa, which last Vancouver adopted, in 1793, and which has since been retained.

ISLAND OF SAN MIGUEL.

This is the westernmost of the Santa Barbara Channel Islands and the most dangerous to approach. It is separated from Santa Rosa by a channel named the San Miguel Passage, which is three miles wide and is described on page 99. It is the southwestern point of the western entrance to the Santa Barbara Channel, which is here twenty-five miles in width between Point Concepcion and the island, or twenty one miles between Point Concepcion and Richardson Rock off San Miguel. It is a good landfall and is visible at a distance of thirty-five miles.

The climatic conditions are very variable around this island. It receives the full force of the northwest winds and swell, and in summer, fogs envelop it more than half the time. Even if the weather clears off in day-time the fogs settle over it at night. When we were encamped for more than three months at Point Concepcion we did not see this and the other islands for several weeks on account of the fog. We found similar conditions on the island in 1852, and during the final survey the same conditions were reported.

The island is somewhat irregular in shape. Its longer axis is seven miles south eighty degrees west, and north eighty degrees east (S. 80° W. and N. 80° E.), and this is the general direction of the south shore, off which thirty to forty fathoms are found close in. The average width is one and a third miles, but at the middle a great ridge, one mile across, juts out to the northward one and a half miles, terminating in Point Harris and forming the western part of Cuyler Harbor. This ridge has bold heads, attaining five hundred and fifty feet elevation. The area of the island is fourteen square statute miles, and the extent of the shore-line is twenty miles. The general appearance of the island from seaward is gently rolling, and when seen from the north or south it first exhibits itself with two peaks about the middle, rising to eight hundred and sixty-one and eight hundred and fifty feet above the sea. The eastern peak, lying one and one-quarter miles south by east (S. by E.) from the astronomical station in Cuyler Harbor, is the higher, and from it the western one bears west, distant one and one fifth miles.

The island is treeless, but covered with coarse grass. It differs from the other islands by being more prominently marked by heavy sand dunes. The shores are bold, broken, and rocky, with a few short stretches of beach.

Cardwell Point, the eastern extremity of the island, is a broad cliff forty feet high, then rising gradually to the westward, and having a dangerous reef stretching one-half mile eastward into the San Miguel Passage, with foul ground and rocky bottom north-northwest (NNW.) for three-quarters of a mile and one-quarter of a mile off shore. Avoid this point.

From Cardwell Point to Sandy Point, the western extremity of Santa Rosa, the bearing is south eighty two degrees east (S. 82° E.) and the distance three miles.

Point Bennett, the western point of the island, is a long, narrow, broken, and jagged bluff, rising forty feet from the water to three hundred and eighty feet within a mile. As seen from all directions, this point exhibits for two miles inland high dunes, the sand of which rises from the northwest shore and is driven by the northwesters across the island. There are three rocky islets under the south shore of the point and a number of rocks and foul ground off it. The small rocks and foul ground are, so far as known, within the limits of the kelp and stretch two-thirds of a mile to the west-northwest (WNW.) and one and one-half miles to north-northwest (NNW.). This point must especially be avoided.

The geographical position of the extreme western point of the island is:

Latitude	34°	01′	55″	north.
Longitude	120°	27′	00″	west.
Or, in time	8h	01m	48s.	

From Point Bennett Point Concepcion bears north seventeen and a half degrees west (N. 17½° W.), distant twenty-five miles, and Bishop Rock, on the Cortes Bank, southeast half east (SE. ½ E.), distant one hundred and sixteen miles.

Point Harris, the northern point of San Miguel Island, is long, quite narrow, broken and precipitous, and the hill behind it on the south rises to five hundred and fifty feet within a mile. There is a depth of fifteen fathoms close off this point, and no dangers except a rock under the eastern angle of the point. Except Prince Island and Crook Point it is the only projection around the island.

Crook Point.—The south shore of the island is more precipitous than the northwest or east shores, and rises to four hundred and fifty and five hundred feet within one-sixth of a mile. The eastern part of the south shore is marked by a broad plateau, forty to sixty feet in height, and near the western part of this plateau is Crook Point. It is a low, irregular projection one and one-third miles west-southwest (WSW.) from Cardwell Point, and stretches out about two-thirds of a mile from the line joining Cardwell Point and Point Bennett. It is free from dangerous rocks, but a patch of kelp lies half a mile broad off it.

Kelp.—The kelp around this island is in detached fields as exhibited on the recent chart of Santa Barbara Channel, published by the Coast and Geodetic Survey. It does not always mark the foul ground about this island. Cuylers Harbor has a large body in it with foul ground in the western half. Simonton Cove, facing to the north northwest (NNW.), has a field one mile long by one third wide, parallel to the shore. No dangers are known among it. There are patches over the foul ground off the western point of Simonton Cove and at the point itself. Off the northwest face, between Simonton Cove and Point Bennett, there is a large field over two miles in length with Castle Rock in the midst. No kelp is found at Wilson Rocks, Wescott Shoal, or Richardson Rock. Along the south shore are five or six patches of kelp stretching out as much as a mile. Wyckoff Ledge, with fifteen feet of water on it, is marked by kelp, but Cardwell Reef, with much foul ground around it, has no kelp laid down there.

Hydrography around the Island.—Off the southern side of the island the water is quite deep along the outer edge of the kelp patches, varying from twelve to twenty-five fathoms; about the fifty-fathom line is one and two thirds miles south of Point Bennett, increasing to three miles south of Cardwell Point; bottom fine gray sand and broken shells. On the north side of the island there is deep water up to the line of kelp, but in the area bounded by the forty-fathom line, which lies from two to five and a half miles off shore, are three dangerous reefs described in detail under the head of *Dangers*. Over this area the bottom is quite varied, through fine, gray sand, gravel, green mud, broken shells, and coral off Prince Island. The one hundred fathom line stretches ten miles towards Point Concepcion, but is close under Point Bennett. Outside of Richardson Rock the one hundred-fathom plateau continues for several miles. In the passage between San Miguel and Santa Rosa the soundings are quite regular at about twenty fathoms over fine, gray sand, broken shells, and coral.

The currents follow the direction of the winds, but in the prevailing northwest weather eddies run to the westward under the lee of Point Bennett, and to the eastward under Cardwell Point in the San Miguel Passage.

Oil Well.—One and a half miles north by east (N. by E.) from Castle Rock the surface water is marked by films of petroleum supposed to arise from oil springs below the surface. They are said to be also indicated by small patches of asphaltum or bitumen similar to that found on the coast west of Santa Barbara. The chart gives a four fathom sounding on the spot.

Dangers.—There are more dangers around San Miguel than around any of the islands of the Santa Barbara group.

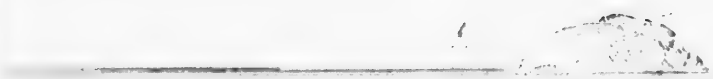
Rocks lie off Cardwell Point; the Wyckoff Ledge off the middle of the south shore; is otherwise clear; off the north and west is Richardson Rock; off the north Wilsons reef, the Westcott Shoal, and Castle Rock.

*Richardson Rock.**—This is a rocky islet about one hundred and sixty-five yards long, five yards wide, and rises by sharp rocky cliffs to nearly fifty feet above the water. The small and lower rocks inside of it towards the island. They are seen detached from the rock only from the northeast and southwestward. It lies north fifty-four degrees west

*Named the Farallon de los Lobos by Don Juan Perez in 1774. On the Carta General that name is given it is designated Richardson Rock on the Coast Survey charts and on recent English charts.

T

Alamos Anchorage, N. by W., 1 mi



Reef

S. 31° E. S. 2° E. Prince Island, SSE., 303 feet. Cuvier's Ha

Richardson Rocks, off West end of San Miguel Islan

Two Rocks.

Alamos Anchorage, N. by W., 1 mile. SE. side Santa Cruz Island. (1851.)

Reef. 700 feet. 500 feet.

SSE., 303 feet. Cuyler's Harbor, S. by E., 5 miles. North Side, San Miguel Island. (1852.)

off West end of San Miguel Island, NW. by N., ¼ mile.

distant five and a half miles from the western point of San Miguel, and south eighty-seven degrees west (S. 87° W.), distant seven and a half miles from the north point.

Its geographical position is:

Latitude	34	06	02	north.
Longitude	120	31	14	west.

It has deep water all around it, there being thirty to forty fathoms within one third of a mile. The islet is the westernmost land of the Santa Barbara Islands and from it Point Concepcion bears north nine degrees west (N. 9° W.), distant twenty-one miles. Point Arguello bears twenty-five degrees west (N. 25° W.), distant thirty miles, and the Bishop Rock, on Cortes Bank, bears south fifty degrees east (S. 50° E.), distant one hundred and twenty-two miles.

No kelp is reported around this rock.

Buoy.—It is proposed to place a *whistling buoy* just outside of Richardson Rock.

Wilson Rock, about one hundred yards in extent and fifteen feet above water, lies north fifty-four degrees west (N. 54° W.) two and one quarter miles from Point Harris, the north point of San Miguel, with a reef stretching nearly one mile north eighty-three degrees west (N. 83° W.) therefrom. There are two points of this reef visible at extreme low waters, and one-quarter of a mile north of these are two shoal spots, one being one hundred and fifty yards distant with sixteen feet of water on it, and the other three hundred yards distant with twelve feet of water. Midway between the extreme rocks and Wilson Rock are three sunken rocks, and one-quarter of a mile south of Wilson Rock is another sunken rock. The chart should be consulted for other rocks close to the main one. The vicinity should be avoided, because in thick or foggy weather the deep water immediately around these dangers gives little or no warning. During heavy northwest gales the sea breaks entirely over the main rock. No kelp is reported around this reef.

The geographical position of Wilson Rock is:

Latitude	34	06	12	north.
Longitude	120	23	53	west.

It is locally known as the West Rock.

Westcott Shoal.—Broken, rocky ground extends in nearly a straight line for one and a half miles northwest three quarters west (NW. ¾ W.) from the northwest point of the island to a small group of sunken rocks close together just outside the kelp field. From this group the shoal extends southwest (SW.) one and a half miles, and thence south three quarters east (S. ¾ E.) for one and one third miles to the extremity of the visible rocks off the western point of the island. Within these limits, which are tolerably well marked by kelp, there are many dangers, including Castle Rock, about five eighths of a mile broad off the northwest shore.

Two thirds of a mile northeast by north half north (NE. by N. ½ N.) from Westcott Shoal there is a four fathom sounding, where it is probable a break occurs in heavy weather. This sounding is near the oil well, one and a half miles north by east (N. by E.) from Castle Rock.

Wyckoff Ledge is a sunken rock with fifteen feet of water upon it. It lies one half mile broad off the south shore, three and a half miles from the western point and four miles from the eastern point of the island. Its exact position is one and a half miles south eighty three degrees west (S. 83° W.) from Crook Point, and on the range of this point and Sandy Point, the western extremity of Santa Rosa Island. It is marked by kelp, with a kelp field to the east and to the west, a broad, rocky bottom, with from three to six fathoms of water, extends from it to the north-northwest and east-northeast (NNW. and ENE.) towards the shore in both cases. It has twenty fathoms of water immediately outside of it, and from eight to twelve fathoms inside to the northeastward (NNE.).

Castle Rock.—This rocky islet, two hundred and forty yards long east and west by sixty yards broad, lies one and a half miles north by east (N. by E.) from Point Bennett.

Its geographical position is:

Latitude	34	03	12	north.
Longitude	120	26	23	west.

It is a three-headed islet, one hundred and forty five feet in height, in the middle of the kelp-field north of Point Bennett. A depth of six and seven fathoms of water is found around it.

Foul ground exists in the kelp one and one third miles north by west (N. by W.) from Point Bennett and two-thirds of a mile west by south (W. by S.) from Castle Rock.

In the kelp, two-thirds of a mile east-northeast (ENE.) from Crook Point, there is *foul ground* and three and a half fathoms of water, the latter about two fifths of a mile from shore.

The dangers off Cardwell Point, and off Point Bennett, and at the west of Simonton Cove are described under those heads, and the dangers in Cuylers Harbor are described there.

To the rocky islets off the north and northwest sides of San Miguel Island vast numbers of sea-lions resort, and the summits of those beyond the reach of these animals are covered with guano and with nests of sea fowl during the breeding season.

There is one bay and several anchorages around this island as follows:

Cuylers Harbor.—The northeast face of the island, stretching south sixty two degrees east and north sixty two degrees west (S. 62° E. and N. 62° W.) for four and a half miles, is indented near the north point by Cuyler's Harbor. This is the best harbor around the island and is a moderately large bay. It is a little more than one mile between the east and west heads and about two-thirds of a mile deep. It has high, bold shores and approaches, and a large rocky islet, called *Prince Island*, half a mile north of the eastern head. This islet is quite prominent, rises to one hundred and three feet elevation, is five hundred yards in extent, and has a precipitous face to the north-northwest (NNW.). There is a depth of six and seven fathoms of water off its southern side. Across the mouth of the harbor stretches a dense mass of kelp, having six fathoms through the greater part, but marked by two reefs and rocks near the middle and almost in line between the heads. The western of these reefs, named *Middle Rock*, bears south fifty-nine degrees west (S. 59° W.), distant four fifths of a mile from the west point of Prince Island; and the rock, named *Can Rock*, in the middle of the eastern reef, bears south seventeen degrees west (S. 17° W.), distant one third of a mile from the same point, whilst a rock one quarter of a mile further in the harbor lies on the same line. In the eastern part of the harbor lie three rocky patches, although the passage way through them, and between Prince Island and the east head of the harbor, has two and a half to six and a half fathoms of water.

Vessels coming into the harbor from the northwest pass one half mile to the eastward of Point Harris, and gradually haul closer in until abreast the third high head, which forms the west point of the harbor, when they pass through the kelp about three hundred yards from the shore and haul in towards the western bight of the bay, where they anchor in five and one quarter fathoms, over hard bottom, with the point of the western head bearing north seven degrees west (N. 7° E.), and the first houses on the shore bearing west by south one-quarter south (W. by S. ¼ S.). This anchorage will be abreast the landing and secure from all but north winds, which rarely blow.

Vessels from the eastern part of the channel should work well under Point Harris and anchor as above directed. If, however, they are compelled to enter by the eastern passage, which is free with kelp, they steer through mid channel between Prince Island and the east head of the harbor, and, if they can lay a course parallel with the southern shore, they keep within one eighth of a mile of it until Can Rock is well shut in on the western point of Prince Island. This must be done in order to avoid the sunken rock which lies on the range of Can Rock and the western point of Prince Island, and one fifth of a mile inside the former; the passage between this sunken rock and the shore is only one quarter of a mile in width. After passing this range, steer for the anchorage in the western bight of the harbor.

This will be found to be a very difficult passage for sailing vessels during northwest winds, as they will be obliged to make several tacks to reach the anchorage, with scant room to work in the heavy kelp to pass through, and it is recommended for them to endeavor to weather Prince Island and Middle Rock, which may be approached on the north sides within two hundred and fifty yards when they can fetch the anchorage within tacking. With winds from the southward and eastward, however, it presents no difficulties if the directions are closely followed.

The holding ground in Cuylers Harbor is not good, nor is it well sheltered from heavy seas, but it is well protected from all winds except from the north and east, which are rare. Water can be obtained at the small house on the hillside. During winter, fresh water drains down the valley to the western part of the long beach southeast half south (SE. ½ S.) from the anchorage.

The geographical position of the summit of Prince Island, which is three hundred feet in height, is:

Latitude	34° 03′ 23″ north
Longitude	120° 20′ 05″ west.
Or, in time	8ʰ 01ᵐ 20ˢ.3.

From Prince Island we have the following bearings and distances:

Point Concepcion Light	N. 31½° W.	24½ miles.
Santa Barbara Light	N. 41½° E.	36½ miles.
West Point of Santa Cruz Island	N. 72° E.	21 miles.

A hydrographic sketch of Cuylers Harbor has been published by the Coast and Geodetic Survey, and the chart of the Santa Barbara Channel shows its relation to the island, Point Concepcion, etc.

The Coast Survey secondary astronomical station, of 1852, is on the southwest part of Cuylers Harbor, about forty feet up on the hillside, near the position of the house abreast the anchorage. Its geographical position is:

Latitude	34° 03′ 07″ north.
Longitude	120° 21′ 48″ west.
Or, in time	8ʰ 01ᵐ 27ˢ.3.

The computed magnetic variation was 15° 00′ east January 1, 1885, and increasing 1′.2 annually.

Barbours Anchorage.—On the south shore, about one mile west from Cardwell Point, is this open roadstead, where small craft anchor for protection from the northwesters in seven fathoms of water, one quarter of a mile off shore. There are small patches of kelp along the shore.

Boat landing.—On the south shore, about two and two thirds miles westward from Cardwell Point, and on the west side of Crook Point, there is a small indentation in the plateau, of one-quarter of a mile in width and three hundred yards deep, forming a good boat landing on the beach in the northwest part of it, but there is no anchorage.

Adams Cove.—On the south side of the western point, about two-thirds of a mile eastward from the extremity, small vessels find a safe anchorage and protection from northwest winds, but the approaches are forbidding unless to those acquainted with them. This anchorage is named Adams Cove.

Tyler Bight.—On the south shore, one and three-quarters miles eastward of Point Bennett, there is a small indentation in the northwestern part of the bight under the high bluff, where anchorage is had in six and a half to eight fathoms of water, with the point to the westward bearing southwest by west three-quarters west (SW. by W. ¾ W.), distant one-half mile. There is a large field of kelp to the south and east of it, but between it and Adams Cove the kelp is wanting.

Simonton Cove.—The northwest face of the island, lying northeast and southwest (NE. and SW.), is five miles long, and its northeastern half is a broad bight, square open to the northnorthwest (NNW.), two and one third miles in width and two thirds of a mile deep. Its southwestern part is named Simonton Cove, where anchorage may be had in from four to six fathoms of water, with the point to the westward bearing west (W.) distant one-eighth of a mile.

The northeastern part of this bight is filled with a field of kelp one and a half miles long and one-third broad, lying parallel with the shore. Stretching out one-third of a mile northwest (NW.) from the southwest point of Simonton Cove is very foul ground and rocks. On the same bearing and three quarters of a mile from the point is foul bottom with three fathoms water in a patch of kelp, upon the outer border of which is a depth of fourteen fathoms.

The shore of this northwest bight is marked by dunes, from which the sand is driven over the highest part of the island, and over the neck into Cuylers Harbor. These sand drifts show the general direction of the wind, which is so strong that deep arroyos are cut across the island by the friction of the driving sand. The highest part of the island is channeled by these arroyos.

Tides.—The tides were observed in Cuylers Harbor, and may be assumed to be the same around the island. The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is 1Xʰ 16ᵐ. The mean rise and fall of tides is three and seven-tenths feet; of spring tides, five and one-tenth feet; and of neap tides, two and eight-tenths feet. The mean duration of the flood is 6ʰ 13ᵐ, and of the ebb 6ʰ 5ᵐ. The average difference between the Corrected Establishment of the a. m. and p. m. tides of the same day is 1ʰ 40ᵐ for high water and 1ʰ 9ᵐ for low water. The differences, when the moon's declination is greatest, are 2ʰ 54ᵐ and 2ʰ 12ᵐ respectively. The average difference in height of these two tides is one and six-tenths feet for the high waters and two and a half feet for the low waters. When the moon's declination is greatest these differences are two and six-tenths feet and three and six-tenths feet, respectively. The average difference of the highest high and lowest low waters of the same day is five and eight-tenths feet, and when the moon's declination is greatest, six and eight-

tenths feet. The highest high tide in the twenty four hours occurs about 8h 35m after the upper transit (southing), when the moon's declination is north, and about 3h 51m before south. The lowest of the low waters occurs about seven and a half hours after the high tide. (See Coast and Geodetic Survey tide tables for the times and heights of high waters, which are first taken out for San Diego, and prescribed constants applied. The heights are very nearly the same as for San Diego.)

The geographical position of the highest point of the island, namely, the eastern peak

Latitude	34°	01′	53″ north
Longitude	120°	21′	55″ west
Or, in time	8h	01m	27s.6

The computed magnetic variation for January 1, 1885, was 15° east, and the annual is 1′.2.

The island of San Miguel was discovered by Cabrillo in 1542, and Cuylers Harbor is in which he wintered. He named the island La Isla de la Posesion and the harbor La I la Posesion because he went through the ceremony of taking possession of the countr here January 5, 1543, having directed Bartolomé Ferrelo, his pilot, to assume the comma expedition and continue the exploration as far north as possible. Ferrelo afterwards na island in whose harbor his commander had wintered, Juan Rodriguez. The Indian n Liquimuymu, and there were three villages upon it.

In 1602 Vizcaino named it San Bernardo, and this designation is retained in the C eral of 1791 preserved in the archives at Madrid, of which we have the tracing of a copy by Navarrete. On his chart it is called Isla de baxos.

In 1774 Don Juan Perez, commanding the frigate *Santiago*, named it Santa Rosa. Spanish charts it was sometimes called San Miguel and Santa Barbara. The present that adopted by Vancouver in 1793.

The total extent of the shore-line of the islands is about two hundred and fifty miles.

The Passages between the Islands of the Santa Barbara Channel.

The Anacapa Passage.

This passage lies between the island of Anacapa on the east and Santa Cruz on t The nearest points of the islands lie south eighty-seven and a half degrees east and nort seven and a half degrees west (S. 87½° E. and N. 87½° W.) from each other, and are f apart, which is the width of the channel. As these points are sharp, there may be sand length to the channel. (See Anacapa and Santa Cruz Islands.)

There are no outlying rocks off either island, and the water is bold close up to them there any dangers in the passage, and the depth of water ranges from twenty-five to fort over a bottom of coral, coarse sand and pebbles, sand and shells. There is kelp close Pedro Point on the west and Anacapa on the east, but none in the channel.

Two and a half miles south by west (S. by W.) from the easternmost point of S Island there is a depth of nine fathoms one mile off shore, affording anchorage under conditions. Smugglers Cove is also used as an anchorage. To the southeast the sound into great depths very suddenly, with bottom of green mud and fine gray sand.

The current through this channel is, so far as known, generally to the southwar occasionally runs to the northwestward.

The Santa Cruz Channel.

This channel lies between the southwestern shore of Santa Cruz Island and the nor shore of Santa Rosa Island. Between the northern points of entrance it is six miles between the southern points five miles. Its length is eight miles and the general direction it is northwest by north and southeast by south (NW. by N. and SE. by S). There outlying rocks off either shore, and the water is bold close up to the islands. There rocks close to the northeast and east points of Santa Rosa, and off the west and southwe of Santa Cruz, but they can not be reckoned as dangers in the channel. (See Carrington, and East Points of Santa Rosa, and Gull Island, Santa Cruz.)

The general depth of the channel is from seventeen to thirty fathoms of water, over of gray sand and broken shells. The deep water from southward makes up into the eas

of the channel as a deep, narrow, submarine valley of one hundred and fifty fathoms, with fifty fathoms close to it. In some places the fifty-fathom line is less than one mile from the two-hundred-fathom line; and directly off Gull Island the depth reaches three hundred fathoms.

In the broad Five Mile Bight or Becher Bay, on the northeast side of Santa Rosa, is anchorage in ten fathoms, over fine gray sand and broken shells, and under the west and southwest points of Santa Cruz are Forney's Cove and Posa Anchorage, all of which are described under their respective heads. (See Anchorages, Santa Cruz and Santa Rosa Islands.)

The current through this channel is from the northwestward, and in summer winds there is more swell here than through the Anacapa Passage.

THE SAN MIGUEL PASSAGE.

This passage lies between the western point of Santa Rosa Island and the eastern point of San Miguel Island. These points lie west by north and east by south (W. by N. and E. by S.) from each other, distant three miles, with a large ledge of outlying rocks off the eastern point of San Miguel and bordering it for one mile. (See Cardwell Point.)

As the opposite points are quite narrow the passage can hardly be considered over two miles long.

The depth of water through the passage is from sixteen to twenty fathoms, over fine gray sand and broken shells. Stretching out over half a mile from the rocks off the east point of San Miguel heavy current-rips are found in southerly gales, where the southwesterly swell and surface current meet the normal current from the northwestward. The soundings in this broken water range from eight fathoms, near the rocks, to eighteen fathoms towards the fair passage; and no dangers have been discovered, after special search, over this ground.

Broken water is also seen for one eighth of a mile off Sandy Point, the west end of Santa Rosa Island, chiefly after heavy northwest weather, when a strong current makes through the passage from the southward and meets the swell.

There is little or no kelp over the foul ground off the east end of San Miguel, but there is a field, from a half to one mile broad, extending all around the western end of Santa Rosa.

All vessels attempting the San Miguel Passage are cautioned not to allow the outer rock off the west point of Santa Rosa to bear anything to the southward or westward of south by east (S. by E.) in order to avoid the Talcott Shoal, for description of which see page 91; but sailing vessels are recommended to avoid this passage altogether, as the light airs and calms under the lee of San Miguel Island and the strong currents in the vicinity frequently combine to drive a vessel toward that dangerous spot.

If vessels do use it, then the course which leads through in the shortest time is south three-quarters west (S. ¾ W.) and north three quarters east (N. ¾ E.), or, in thick weather, steer southeast one quarter east (SE. ¼ E.) diagonally through the passage from seven-eighths of a mile off Prince Island (off Cuylers Harbor) to a position one half mile off Bee Rock, one and three-quarters miles southeast (SE.) of the west point of Santa Rosa. This will pass Prince Island in thirty fathoms and Bee Rock in twenty fathoms. The lead will be of great service on this course in approaching the passage in thick weather, and the sound of the breakers will also serve as a guide and warning.

Sailing vessels from the southward should not attempt the passage.

The *currents* generally follow the direction of the wind, but strong eddies run counter under the lee of the islands and projecting points. In northwest weather a strong current sweeps from under Cardwell Point, the eastern point of San Miguel, across the passage eastward towards the Talcott Shoal, and is frequently felt on that danger and to the eastward of it. This, the most dangerous current of the locality, should be especially noticed when attempting the passage.

Deep-sea Soundings off the Santa Barbara Islands.—We have elsewhere given the deep sea soundings of the U. S. S. *Tuscarora* from San Diego to the southward and the westward of the

Cortes Bank. We now tabulate those taken off the Santa Barbara Islands, repeating four of the former:

Latitude.	Longitude.	Depth (fathoms).	Temperature.		Character of bottom.
			Surface.	Bottom.	
Dec. 28, 29, 1873.					
33° 41′	120° 16′	1,833	57.0	33.7	Yellow brown mud.
32 54	120 09	551	57.0	39.1	Hard, black sand.
33 05	119 56	542	57.0	39.1	Do.
33 16	119 50	130	56.8	.....	Do.
Dec. 26, 27, 1873.					
33 32	119 50	260	56.4	43.0	Black sand.
34 33	120 14	634	56.0	38.1	Hard.
33 35	120 28	694	56.4	37.3	Greenish mud.
34 04	120 38	590	56.8	38.8	Coarse, gray sand.
33 41	120 50	1,092	57.0	35.1	Gray sand, mud, gravel.
34 50	121 13	1,367	56.0	34.1	Hard, black sand.
34 03	121 14	1,783	55.6	33.7	Greenish mud.
34 09	121 33	1,988	57.0	35.1	Greenish ooze.
34 23	121 32	1,905	57.0	33.2	Dark green mud.
34 29	121 23	1,198	56.0	34.7	Green mud and sand.
34 26	121 16	490	55.2	39.2	Grayish black sand.

It will be noticed that the two soundings, one hundred and thirty and two hundred are, respectively, west southwest and west (WSW. and W.), seventeen and twenty fo from the northwest point of San Nicholas, and that the last four are forty to fifty-five miles south (W. by S.) from Point Concepcion.

These last indicate very irregular bottom on the prolongation of the axis of the Sierra Concepcion or Santa Ynez. The deepest soundings show that the inner edge of the great Pacific comes within less than fifty miles of the coast termination of those mountains.

In subsequent deep sea soundings off Point Concepcion, by two different vessels, a sub mountain was found rising from the deep plateau of the Pacific. Four soundings are three hundred and eighty-eight, four hundred and four, nine hundred and seventy-five, a teen hundred and seven fathoms, the first three with rocky bottom. These are surrou depths of twenty-two hundred and eighty-eight, twenty-two hundred and seventy six, two hundred and sixty-one, and twenty-seven hundred and eleven fathoms, with brown ooze a mud. The geographical position of this summit is latitude 32° 56′ north, and longitude west, being six hundred and fifteen miles south eighty one and a half degrees west (S. 81½ W from Point Concepcion Light.

This completes the description of the Santa Barbara Islands and mainland adjacent.

FROM POINT CONCEPCION NORTHWARD.

POINT ARGUELLO.*

The first headland to the northward of Point Concepcion is Point Arguello, distant eight four fifths miles and bearing north sixty four degrees west (N. 64° W.). This is the extremity of one of the secondary axes of the Sierra Concepcion, where the serpentine rock seen in large masses stretching into the sea.

In the largest sense this forms a great cape, two and a half miles broad, projecting half miles westward of Point Concepcion, and forming the first angle of the deflection of line in coming from the north, as Point Concepcion forms the second. From the coast the smaller points of the cape have received specific names, but Point Arguello proper thest small projection of the cape to the westward. From the moderately high and rocky the land forming this cape rises in long, converging ridges to the crest line at sixteen feet above the sea.

In coming from seaward the *landfall* for this cape is the *Tranquillon Mountain*, a triple peak (but generally seen as double-headed), which rises to an elevation of twenty-one hun

* Named by Vancouver in November, 1793, after Lieutenant Arguello, commander at San Francisco. Vo

to Landing

Mountain, 2,136 feet.

Espada Cliff, 360 feet.

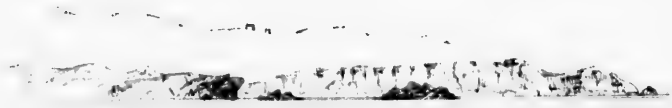
Point Island

Cañada H

Tranquillon Mountain, 2,136 feet.

Point Arguello, SE. by S., 2¼ miles.

Point Arguello, NW. by W. ¼ W., 11 miles.



Point Arguello, ESE., 1¼ mile

Rocky Point.

San

Cañada Honda

Tranquillon Mountain, 2,136 feet.

Point Pedernales, E. by S. ¼ S., 1¼ miles

Argnello Landing.
Tranquillon Mountain, 2,136 feet.
Espada Cliff, 360 feet.

Rocky Point. Santa Rosa Island. San Miguel Island.

Point Arguello, SE. by S., 2¼ miles.

eighty-one feet, at four and a half miles north seventy degrees east (N. 70° E.) from the extremity of the point, but only one and four fifths miles back from the shore line of the bight. The mountain lies nine and one-quarter miles north forty-five degrees west (N. 45° W.) from Point Concepcion Light. The western peak is the highest; the easternmost peak is a scant quarter of a mile distant.

The geographical position of the primary triangulation station of the U. S. Coast and Geodetic Survey on the summit of this mountain is:

Latitude	34° 31′ 52″.09 north.
Longitude	120° 33′ 41″.01 west.

It is visible at a distance of fifty-three miles.

The coast-line between Point Concepcion and Point Arguello curves in a long, regular sweep, two miles deep, to the northeastward. It is bordered by bold, rocky cliffs generally ranging one hundred feet in height but reaching nearly four hundred feet at the deepest part. The crest-line of the mountains behind is barely two miles distant from the shore and parallel therewith. It reaches twenty one hundred and eighty-one feet elevation at Tranquillon. Three and two-thirds miles east by south (E. by S.) from Tranquillon is Oak Mountain, two thousand and forty-four feet high, and marked by large oak trees. Between it and Tranquillon is Prospect Mountain, of fifteen hundred and eighty feet elevation. In front of this crest-line, and half-way towards the shore, is a subordinate series of outcropping heads giving the idea of a parallel and lower ridge in certain directions.

The deepest part of this curved shore, between Point Concepcion and Point Arguello, is a [illegible] formed by the sliding away of the face of a great transverse ridge. It is known to the [illegible]rs as the *Espada*, and lies five and a half miles north forty-two degrees west (N. 42° W.) from Point Concepcion Light. The highest part is broken about one hundred and twenty yards from the water, and at its greatest elevation is three hundred and sixty feet above the sea. It falls steeply to the southeast to sixty-five feet and to the northwest to ninety feet. Behind the head of the Espada is a slight depression in the ridge, which then rises directly to Oak Mountain, already mentioned, bearing north twenty eight degrees east (N. 28° E.), one and two-thirds miles from the [illegible].

West of the Espada the cliffs continue at an elevation of one hundred feet for four miles, when they decrease to fifty feet, and then increase towards Rocky Point. There are no known outlying dangers along these cliffs.

Arguello Landing.—About half a mile west of the Espada is the wharf for shipping produce from this vicinity. It lies north forty six degrees west (N. 46° W.), six miles from Point Concepcion, and is readily recognized by reference to the Espada. The landing is broad open to the sea, but the swell is somewhat modified by the fields of kelp lying off the shore. They begin three miles northwest from Point Concepcion and run in broken fields for about five miles, at a distance of half a mile from shore, and generally one quarter of a mile broad.

When a vessel is a little more than half way from Point Concepcion towards Point Arguello, the [illegible] wharf will be directly under Oak Mountain, bearing northeast (NE.), with the Espada [illegible] to the eastward.

It is probable that the bight between Point Concepcion and Point Arguello is the Ensenada de [illegible] of Vizcaino's chart.

Point Arguello is the very narrow, jagged, rocky projection stretching out west-southwest (WSW.) nearly eight hundred yards from the general curve of the cape, with a width of two hundred yards and a height of one hundred and twenty feet over the cliffs on the south side and of forty to sixty feet on the north. As seen from the south and north it is a low, long, dark projecting point, nearly of the same height for over half a mile back. The extremity is only forty feet above the sea, with an outlying rock on the line of the southern cliffs two hundred yards seaward and sixty yards in extent; but there are plenty of smaller rocks between the point and the [illegible] rock. Five hundred yards in from the point the south cliff rises to one hundred and twenty feet above the sea, and then a narrow cut from the south side nearly reaches a similar cut from the north side, forming a depression or saddle of sixty feet. East of this depression the south cliff rises again to one hundred and twenty feet. On this account the point shows two very slight [illegible] when seen from the south by east (S. by E.) and north by west (N. by W.), and it is a mere question of time when the outer head shall be separated completely from the inner by the wearing action of the sea.

The point has one marked peculiarity important to the navigator coming upon it unexpectedly in unfavorable weather—the surface of the extremity of the point now projects beyond and overhangs the base at the water's edge, as if the lower part had fallen away. We can not recall this notable form in our earlier acquaintance with it, and the shape will probably change when the upper projection breaks away.

Rocky Point.—One mile southeast by south (SE. by S.) from Point Arguello is a slightly projecting rocky point, marked by a great many detached rocks close under and around it, and by smooth, rounding hillocks, three hundred or four hundred feet high, close behind it. When the point is seen from the northwest, just outside of Point Arguello, two houses cut the outline against the sky.

From Rocky Point the rugged shore curves to the east southeast (ESE.) and nearly east for a couple of miles before making its sweep towards the Espada and Point Concepcion.

Rocky Point, with its high rounding hills, shuts off the direct view from Point Arguello to Point Concepcion, but since the placing of the whistling buoy off the Point, the coast steamers from the north run for the buoy and then lay a straight course to Point Concepcion, as the coast is opened out nearly half a mile clear of Rocky Point.

Three quarters of a mile north by east (N. by E.) from Point Arguello is another high and very slightly projecting, rocky point with a cluster of rocks close under it.

The whole of this projecting cape has a very [illegible]d shore-line, but has deep water outside the rocks, and no outlying dangers have ever been [illegible]ed. When the summer fogs begin to come they envelop the point, and vessels must give it a good berth in passing. The winds blow quite strong over it, and the swell is larger than off Point Concepcion, because the full force of the northwesterly swell is deflected by Point Arguello.

Off Point Arguello vessels from the northward first sight the islands of the Santa Barbara Channel just above the horizon. San Miguel and Santa Rosa are seen in clear weather, the latter just touching the rock off Rocky Point and stretching west as a long, horizontal line with [illegible] on the west, and the former rising as one long, low rounding mass, and a smaller head to the west.

Automatic Whistling Buoy off Point Arguello.—As an aid to navigation in thick and foggy weather the *automatic whistling buoy* has been replaced off Point Arguello in seventeen fathoms water over hard sandy bottom on the following bearing and range: Coast Survey signal on point in range with sharp peak east-northeast. It is painted with *black and white perpendicular stripes.*

The geographical position of the extremity of the cape is:

Latitude	34° 34′ 27″.7 north.
Longitude	120° 38′ 53″.3 west.
Or, in time	8h 02m 35s.6.

The computed magnetic variation for January 1, 1885, was 15° 12′ east, and the annual increase is 7′.2.

From Point Arguello we have the following bearings and distances to important points:

Point Concepcion Light (not intervisible)	S. 65¼° E.	11¾ miles.
Middle of San Miguel Passage	S. 45° E.	37¼ miles.
Richardson Rock, off San Miguel Island	S. 28° E.	29 miles.
Point San Luis (Obispo)	N. 23¼° W.	36 miles.
Piedras Blancas Light-house	N. 40¼° W.	72 miles.
Point Sur	N. 45° W.	120 miles.

When a vessel is broad off Point Arguello and well out to sea, the peak of San Rafael, two hundred feet high, can be made out at a distance of forty or forty-five miles from the coast. This landfall is in

Latitude	34° 42′ 38″ north.
Longitude	119° 48′ 51″ west.

The off-shore soundings mentioned under the head of Point Concepcion apply equally to this cape.

As this cape is more westerly than Point Concepcion, and a point of departure for the vessels going south outside the islands, it is important that a light-house and fog-whistle should be placed there; and the United States has made a Reservation of Point Arguello for this purpose.

Tranquillon Mountain, SE. by E., 2,136 feet.

Point Pedernales

Tranquillon Mountain, 2,136 feet.

In hazy weather.

Mount McGill, 9,214 feet, 77 miles.
Lompoc Landing, ENE., 3¼ miles.

San Rafael
La Puri

Point Pedernales, SE. by S., 7 miles.

Point Arguello, S8E., 8¼ miles.

y weather.

Black head of La Honda.

Point Arguello, SE. by S., 7 miles

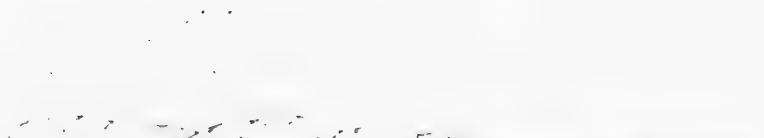
miles.

miles.

San Rafael Mountain, 6,227 feet, 43 miles.

La Purisima River, or Santa Ynez.

Tranquillon Mountain, SE. by E. ¾ SE., 8¼ miles.



Tranquillon Mountain, 2,136 feet.

Point Arguello, SE. by S., 7 miles.

Upon the outlying rocks of Point Arguello the steam ship *Yankee Blade* struck and was lost on the 1st of October, 1854, when four hundred and fifteen persons perished.

The point is indicated on Vizcaino's chart, but no name was given to it; nor did Cabrillo or Ferrelo refer to it.

On the Carta General of 1791, embracing the Spanish discoveries to that date, it is called Punta Pedernales (Point of Flints), but frequently and erroneously printed Pedro Nales upon other charts. Formerly it was called San Pedro Nolasco. It is known to the old resident Spaniards as Pedernales, but Vancouver's name is retained.

*Point Pedernales.**—This point lies one and two thirds miles exactly north of Point Arguello, and may be fairly considered the northern limit of that notable headland as Rocky Point is considered the southern limit. It does not project far from the general trend of the shore-line, and is of small extent, but the lower land to the north brings it out. It rises to one hundred and fifty feet elevation, with steep slopes to seaward and a moderately low neck behind it. When seen from the northwest, two or three miles distant, it shows two black hillocks against the higher land further to the eastward across the Cañada Honda. Close under the cliffs of the small, jagged points just north and south of it lie clusters of rocks. A rocky islet, fifty yards in extent, lies two hundred yards west southwest (WSW.) from the extremity of the point, whilst some rocks above water stretch one hundred and fifty yards still further to the westward. There are two sunken rocks lying off the point, the farthest, three hundred and fifty yards west northwest (WNW.), and the other, two hundred and fifty yards west from the rocky islet.

This black point and the black rock are quite conspicuous objects, the more especially as the sand dunes over the cliff commence on the north side of the Arroyo Honda.

As at Point Arguello, the high mountains rise rapidly a short distance behind the coast-line. There is deep water off the point, and no hidden dangers have been reported other than those mentioned.

The Cañada Honda.—Three-eighths of a mile northward of Point Pedernales the stream through the deep, narrow gorge of the Cañada Honda enters the ocean at a beach one hundred and fifty yards long. To the northward of the cañada, the sand appears to have been blown up over the high, white-faced cliffs, and covers the slopes of the hills apparently as high as three hundred feet, extending to the mouth of the Purisima River. This is a notable feature in this vicinity. The mesa carrying these sand dunes rises gradually to the northward of the Honda and then descends to the Purisima. Southward of the arroyo, the black cliffs and rocks form a marked contrast in the shore line. This cañada may be reckoned the northern limit of the great headland Point Arguello.

From Point Arguello the *general trend of the coast* is northwest to Point Reyes, two hundred and forty miles distant, passing tangent to Point Sur in latitude 36° 19½′ north, and inside the Southeast Farallon. Immediately north of Point Arguello are the points Purisima, Sal, and San Luis, nearly in line to the north-northwest (NNW.).

The Santa Ynez or Purisima River.—Eight miles north of Point Arguello a small stream empties into the ocean. It rises in longitude 119° 20′, about fifteen miles from the coast, and runs parallel therewith behind the Sierra Concepcion, flowing through a rich grazing country.

Cabrillo in 1542 was searching for a large river in this vicinity, having been informed of its existence by the Indians of Santa Barbara Channel. He gave it the prospective name Nuestra Señora.

The Santa Ynez was considered by Vancouver the largest river he had seen south of the Columbia, doubtless judging by the appearance of the valley, but it is comparatively insignificant and unimportant. He states that on the old Spanish charts it is called the Rio de San Balardo. Arrowsmith in 1798 calls it River Verardo. On a French chart of 1841 it is called the San Geraldo; and on Duflot-Mofras's collection of charts, 1848, the River Benardo. On the early Coast Survey charts it is designated La Purisima from the Mission La Purisima Concepcion, situated a few miles inland. On the State map of California it is called the Santa Ynez, after the mission of the same name situated further inland. On the official county map it is named the Santa Ynez River.

Between this stream and Point Purisima the shore line is bold, with a few rocks close under it, and short stretches of sand and rock beach at low water. For two miles from the river, to Lompoc Landing, there is a strip of mesa not over twenty feet high, reaching back one-quarter of a mile to the higher mesa. Low sand dunes show in places on the outer edge of this low mesa.

* *Point Pedernales.*—This was named by the Portolá expedition of 1769, because the soldiers found good flints there.

Between the Lompoc Landing and Point Purisima, the sand has drifted into great dunes of about one hundred feet in elevation and sparsely covered with chaparral in places. These dunes form ridges and valleys running northwest and southeast, in the direction of the prevailing winds, and rise higher and higher to the chaparral covered mesa about half a mile from the shore line.

When a vessel is running down the coast southward of Point Purisima and three or four miles from it, with the mountains of the interior hidden by haze or smoke, the only land visible is a long level line of country apparently two or three hundred feet in elevation. This long mesa continues south of the Santa Ynez River, whose mouth breaks its continuity. The mesa then rises gradually to high hills, which again fall away towards the Honda. In this long line the Lompoc Landing is denoted by three or four large white houses above the water line.

Lompoc Landing.—The wharf is located nine and a half miles north five degrees west (N. 5° W.) from Point Arguello, or nine and three-quarters miles north one and a half degree east (N. 1½° E.) from the whistling buoy off that point. It is one and three-quarters miles southeast from Point Purisima, but it is not intervisible therewith, being hidden by a slightly projecting point half a mile northwest by west from the wharf. Off this point stretches a reef of sunken rocks and a kelp-field still farther to the westward, affording some protection to the wharf in northwest weather; but it is broad open to the southwest.

In 1886 there was completed a new and substantial wharf three hundred and twenty yards long and stretching out very nearly southwest by west through the scattered kelp to fourteen feet of water. The approaches to the wharf are not good because a detailed examination has shown as little as eleven feet of water close under the southeast side and abreast the outer end. The bottom is all rocky, so that a vessel's lines will be chafed and cut if allowed to drag over it. Vessels lie on the southeast side of the wharf at the end where it is forty feet wide and moor to four mooring-buoys. The outer buoy lies in four fathoms of water two hundred and thirty yards nearly southwest from the end of the wharf; another lies in twelve feet of water seventy yards nearly west from the northwest corner of the wharf; and two breast-moorings lie one hundred and thirty yards south-southeast, and one hundred and seventy five yards southeast by east from the southeast corner of the wharf. On the north side of the wharf the depth decreases rapidly; on the south side it increases slowly, but there are many rocks projecting two or three feet above the general level of the bottom. At one mile outside the wharf the depth is four fathoms over rocky bottom, and it is said the heavy southwest swells in winter begin to break that distance from it.

Extensive warehouses and other buildings, all whitewashed, are situated on the bluff at the inner end of the wharf. A railway is laid through and alongside these warehouses to the end of the wharf, which is built on a slight incline, so that the loaded cars run to the end by gravity.

The town of Lompoc is situated on the left bank of the Santa Ynez River about eight miles from the landing. It has stage connections with Gaviota, in the Santa Barbara Channel, and Los Alamos, the present terminus of a railroad hence to Port Harford. There is an extensive area of rich agricultural country in the immediate vicinity of the town.

About half a mile northwest of the mouth of the river and one and a half miles southeast from the Lompoc Wharf there has been constructed the inner part of a wharf abreast Mherin's warehouse; but it is not yet built out to deep water, which at this point is at a much greater distance from the shore, and the location is not favorable.

Point Purisima.—This is the first prominent point northward of Point Arguello and is about twelve miles from it. A reef makes out from the point about a quarter of a mile to the southwest. The point is quite low, but rocky, and rises very gradually to a mesa about three hundred feet above the sea at one mile to the eastward. The north side of the point is entirely sand, and for three or four miles further north it is sandy to a height of one hundred feet, spotted with black tufts or patches. When this point bears southeast one-quarter east (SE. ¼ E.) the double peak of Tranquillon Mountain is seen just to the southward of it. When first seen northwest (NW.) of Point Purisima the low outstretching Point Arguello is distinctly made bearing south-southeast (SSE.) seventeen miles distant.

About one mile off Point Purisima the soundings at eighteen fathoms give white sand, and thence on a line to Point Arguello, abreast the Santa Ynez River, the soundings are twenty fathoms over fine gray sand.

The point was named after the rancho of which it is the westernmost limit.

Three miles northward of Point Purisima there empties a small stream called the Guaymas

Point Sal, N. by W. ½ W., 9½ miles.

Breakers. Point Sal, N. by W., 4 miles. (1851.)

Point Sal, E. ½ S., 1½ miles.

River. On the State map of California it is called the San Antonio Creek, but it is now named the *Jesus Maria* Creek after the rancho through which it flows. In 1849 the U. S. Quartermaster's steamship *Edith* was wrecked near here, but the exact locality was forgotten until 1884, when the torrents from the creek washed away the sand and exposed the old wreck.

Half-way between Point Purisima and Point Sal the soundings on the chart show eighteen fathoms over fine gray sand.

Point Sal and Anchorage.*—This cape lies twenty miles north by west two thirds west (N. by W. ⅔ W.) from Point Arguello, and is marked by streaks of yellow sandstone, except at the extreme point. It is a bold headland, formed by four or five dark, peaked, rocky hills several hundred feet high and stretching inland from the point. Behind this rises the ridge (which is one of the secondary axes of the Sierra Concepcion) that stretches inland nearly east, increasing in height for about three miles to Mount Lospe, where it attains an elevation of sixteen hundred and forty-seven feet above the sea. It is treeless, but covered with coarse grass and chaparral. On the official county map this line of mountains is designated the Azufre Hills.

When made from the northwest, Point Sal presents itself with a sharply inclined sea-face rising to a moderately low, conical hill, with two higher conical hills behind, followed by a long incline under which is a great sand drift which has been blown up and over the bluff by the northwesters. Between this large dune and the point are other dunes separated by the dark, natural ground. No rock shows off the point from the above direction. When seen from the westward the dark, conical hills are projected against the high land further east and south, and a large, rocky islet is seen on the south face; also a small rock close to the point. When seen from the southward the conical hills are not so marked, but their dark mass is shown against the distant hills to the north and east. Moreover there are now two marked, great, yellowish, crescent-shaped streaks under the crest-line of the ridge where it reaches its greatest height. These crescents have their convex sides towards each other, and the eastern is the larger.

Before being up with Point Sal, Point Buchon is visible well to the westward, and in clear weather, the high mountains near Cape San Martin and beyond.

The Anchorage.—The flank of the mountain spur forming Point Sal protects the anchorage, which is south of the point, and presents thereto a great wall extending north seventy-eight degrees east (N. 78° E.) for one and five-sixteenths miles to the opening on a slight valley marked by a few bushes, and near the northern part of a half-mile stretch of sand beach guarded by constant rollers.

The three-fathom line stretches three hundred and twenty yards southwest from the point and is marked by breakers. The "outer breaker" lies five hundred and sixty yards south fifty-five degrees west (S. 55° W.) from the point, with ten fathoms of water close to it, except on the east side. A rock and heavy breakers lie south four hundred and thirty yards from the point; and between these and the outer breaker there is an occasional break on a rock with twelve feet of water. The south end of Seal Rock (an islet forty-five feet high, and nearly one hundred yards in extent) lies south sixty degrees east (S. 60° E.), seven hundred yards distant from the westernmost part of Point Sal; but the north side of the islet is only two hundred yards off the nearest shore, with three fathoms between them. Two hundred yards off the southwest face of the islet are constant breakers and a rock, besides several sunken rocks having but two to four feet of water upon them. Along the south face of the point a depth of three fathoms is found within one or two hundred yards.

The curve in the coast under Point Sal is about three-quarters of a mile deep and two miles across, with soundings in seven fathoms over a very uniform bottom of hard gray sand; a depth of five fathoms is found from half to one mile off shore. The roadstead forms a tolerably good shelter from the prevailing northwest winds, but is always subject to a very heavy swell with them. It is broad open to the southerly winds and swell. The best anchorage is in seven fathoms water, about five hundred yards south seventy-eight degrees east (S. 78° E.) from the north end of Seal Rock, with the extreme end of Point Sal just open by the north end of the rock; bottom hard, sand and mud with mica.

This roadstead was surveyed in 1867, and a chart of it published in 1868, by the Coast Survey.

There were two landings or chutes under Point Sal, the old Los Alamos and Santa Maria chutes, about two and a half miles southeastward of the point, and the wharf deep in the bight

*Named by Vancouver in November, 1792, after Ensign Señor Don Hermegildo Sal, acting commandant of the Presidio of San Francisco. Vol. II, p. 3.

under the high land. These are both abandoned (1883) and the warehouses removed to San L... Obispo, whence freight for Point Sal is taken. It is, however, proposed to use the chute again ... there is a gypsum quarry in the vicinity.

A short distance northward of Point Sal there was formerly a surf landing called *Millers L... ing.* Schooners were loaded by the use of a decked-over surf boat which was hauled through ... surf by means of an endless rope passing through a block secured to a buoy outside.

Off this part of the coast it is reported that the iridescent films of submarine petroleum ... seen on the surface of the sea.

Deep-sea Soundings off Point Sal.—A line of deep sea soundings was run on December 26 ... 27, 1873, from eight miles northwest (NW.) of Point Sal down to the southwest by south (SW ... S.), a distance of sixty-eight miles southwest (SW.) from the point. These place the one-f... sand-fathom line a little less than forty miles off shore, and the two-thousand-fathom line f... seven miles from the coast. These soundings are tabulated as follows:

Latitude.	Longitude.	Depth.	Temperature.		Character of bottom.
			Surface.	Bottom.	
35 01	120 44	46	54.1	.....	Greenish mud, fine sand
34 57	120 47	80	54.1	48.1	Clay and mud
34 55	120 53	176	55.0	.....	Dark mud and sand
34 45	121 06	300	55.1	41.8	Greenish mud, black sand.
34 36	121 16	400	55.2	39.5	Grayish black sand.
34 29	121 23	1,128	56.0	34.7	Green mud and sand
34 23	121 32	1,995	57.0	33.2	Dark green mud

Inshore Hydrography from Point Concepcion to Point Sal.—Immediately off Point Concep... the depth has been shown to be very great at a short distance, reaching one hundred fatho... less than three miles. Off Point Arguello the ten-fathom curve is less than half a mile from ... projecting points of the cliffs, with bottom of fine broken shells and gray sand; at one and ... quarter miles twenty fathoms over fine gray sand. At four miles there is a depth of forty ... fathoms over dark gray sand north of the point, and fine gray sand and mud south of it. Bet... Point Concepcion and Point Arguello, the ten-fathom line is less than a mile from the shor... generally just outside the lines of kelp. At three and a half miles from shore the depth is ... forty fathoms over fine gray sand and mud.

Following the coast northward of Point Arguello the ten-fathom curve is close to Point ... risima and Sal, but in the intervening bights it will average three-quarters of a mile from ... The twenty-fathom line is also closer on the points, averaging one and a half miles, but the ... fathom curve is about four miles from shore.

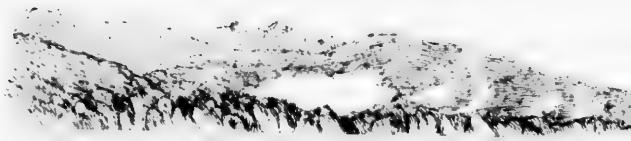
The deep-sea soundings show that nine miles outside the southern shore of San Luis O... Bay there is a depth of eighty fathoms; eleven miles off Point Sal, one hundred and seven... fathoms; and twenty-three miles off Point Purisima, three hundred and nine fathoms.

The general trend of the coast line from Point Sal is north for about twelve miles, when the ... begins sweeping to the westward to form the bay of San Luis Obispo. From seaward the g... appearance of the stretch of coast south of Point Sal is similar to, but much lower than that b... Points Concepcion and Arguello; but after passing to the northward of Point Sal, the mou... fall back and the shore is formed of low sand hills for a distance of fourteen miles. Abou... way in this stretch the dunes extend almost three miles from the coast and behind them l... Santa Maria Valley. Several small streams from the different valleys find their way to the ... through these sand dunes, which cause them to spread out and form extensive lakes and m... in seasons of freshet. The first of these streams is the *Santa Maria River*, which forms par... boundary of San Luis Obispo and Santa Barbara Counties, and on which the town of Gua... is located, four miles from its debouchure into the ocean, four miles from Point Sal. The ... the *Arroyo Oso Flaco*, eight miles from Point Sal; and lastly, the *Arroyo Grande* and the ... *Creek* open upon the ocean by one mouth, twelve miles from Point Sal, or two and a half mile... the northern end of the stretch of sand beach.

Pismo Landing.—This landing is situated about two and one-quarter miles north-nor... ward from the mouth of the Arroyo Grande and one and a half miles southeast of the so...

Point Buchon

Point Sal, N. by W., 7¾ miles



Sand dunes.

Point Buchon, NW. by W., 20 miles

Point San Luis NW., 23¼ miles

es.

Point Sal, SE. ¼ S., 5 miles.

t San Luis NW., 23¼ miles.

San Luis Obispo Bay

Point Sal, N. by W., 7¼ miles.

Saddle Mountain, 1,834 feet. Port Harford. San Luis Obispo Bay.

Whaler Rock.

Point San Luis, NW. by N. ¼ N., 5¼ miles.

Lion Rock, Point Buchon.

7W., ¼ W., 10 miles.

Pecho House.

Saddle Mounta
1,834 feet.
Point San L
NW. by N. ¼ N., 5¼ mi

point of San Luis Obispo Bay. From Point San Luis (Obispo) it bears north eighty-seven and a half degrees east (N. 87½° E.), distant five and a half miles, and is a little over one-quarter of a mile to the southward of the northern end of the long Pismo sand spit. Hence to the northwestward the shore-line is rocky bluff. At this point on the beach, and just where the low cliff succeeds the long line of sand dunes, a wharf thirteen hundred feet long and twelve feet above high water has been built out to fourteen feet of water. There are two large warehouses at the shore end, and the seaward end is made double the width of the main part. A railway track runs from the warehouses to the extremity. One mooring buoy lies about two hundred yards outside on prolongation of the line of the wharf, and two others east of the wharf; but all are liable to be changed. There was formerly a surf landing here. The wharf is somewhat sheltered by a heavy field of kelp which extends from the southern portion of San Luis Obispo Bay along the rocky shore towards the beginning of the sand beach, but does not reach to the wharf. Other than this it is entirely exposed.

In approaching the wharf, vessels should be careful to avoid a sunken rock with only twelve feet of water upon it at ordinary low tide, which lies south seventy-six and a half degrees west (S. 76½° W.) a little over one and one-third miles from the end of Pismo wharf, and south fifty four degrees east (S. 54° E.) two thirds of a mile from Bird Rock. (See Dangers in San Luis Obispo Bay.

A landmark one and one-quarter miles to the west northwest (WNW.) from the Pismo wharf is a large red barn and yellow house on the sloping hillside one hundred feet above the sea and two or three hundred yards inshore.

A portion of the produce from the Santa Maria and other minor valleys in the vicinity is shipped from this wharf in small coasting vessels. The nearest town to the landing is Arroyo Grande, about five miles east of the wharf. It has about fifty houses.

BAY OF SAN LUIS OBISPO.

The *Monte Del Buchon* is a good landmark for San Luis Obispo Bay when made from the southeast or northwest, and has more of the character of a short, serrated range parallel with the general direction of the coast. In good weather Saddle Peak, eighteen hundred and thirty-three feet in elevation, and the highest point of the range, is visible from a distance of forty eight miles, and when a vessel is ten miles south of Point Sal, Bare Hill and Point San Luis are very nearly in range with the highest point of the mountain, while Point Buchon and the mountains of Cape San Martin are in view. With a hazy atmosphere over the land inside it stands out very prominently.

The geographical position of Saddle Peak, as determined by the Coast and Geodetic Survey, is:

Latitude	35° 13′ 14 .6 north.
Longitude	120 47 38 .0 west.

Twelve miles to the northeast by east of Saddle Peak is Mount San Luis, which is twenty-eight hundred and forty-five feet in elevation and visible from a distance of fifty-nine miles. Still further inland rises Mount San Jose, thirty-seven hundred and seventy-six feet above the sea, and San Juan or Dome Mountain, about four thousand feet, the latter, twenty-three miles east northeast (ENE.) from Saddle Peak, is visible on the horizon at seventy miles.

For description of the sea face of Monte del Buchon see page 113.

Point San Luis, which is the western head of San Luis Obispo Bay, lies north twenty-four degrees west (N. 24° W.) thirty-five miles from Point Arguello. It is a high, bold, rocky point, forming the southeastern spur of the Monte del Buchon, whilst Point Buchon forms the northwestern spur, and is the point first prominently seen from the southward. Point San Luis lies four and one-eighth miles south forty degrees east (S. 40° E.) from the highest part of the mountain which is eighteen hundred and thirty-three feet in elevation), and rises rapidly to a ridge seven hundred and three feet above the sea, bare on top, but the sides, especially the southeast or bay side, densely covered with scrub.

Bare Hill, eleven hundred and eighty-three feet high, is a good landmark, and lies two miles north-northwest (NNW.) from the point. The high, bold, and rocky cliffs westwardly from Point San Luis are bordered by numerous rocks, which, however, do not extend further out than four hundred yards. The point is marked by a large outlying islet of basaltic rock, seventy-five feet high, known as *Whaler Island*. It is seventy-five yards in extent, and its somewhat rounded and

cleft summit is covered with grass and a few bushes. At the time of the last hydrographic (1875) the summit was marked by an old, rootless, wooden hut.* It has been proposed to l harbor light on this islet. Several small rocks lie between the point and this islet, dispo straight line like a series of gigantic stepping-stones and forming a protection for the bo apparatus of the whalemen who are located on the extreme end of the point and who fre run their boats out and in between these rocks instead of pulling round the islet or reef. Whaler Island breakers make out to two long, low, narrow rocks which lie seven hundred a yards south sixty degrees east (S. 60° E.) from the point and which are almost constantly over by the swell. These are locally known as *The Reef*. There are boat-passages betwee rocks and the islet, the widest and best close to the reef, but all dangerous to strangers. On the inside of these rocks the chart lays down four to five fathoms of water. Four hundred north of the point, and close under the shore, lies another rocky islet nearly one hundred long and fifty-two feet high. This and the higher islet off the point were formerly called the and South Whaler Rocks. From the steam ship wharf the outer end of the north islet is the inner end of the south islet.

San Luis Obispo Bay has roughly the form of the larger half of an ellipse of three miles and a half; it is broad open to the south and protected on the west, and is therefore a good mer anchorage. From Point San Luis the western shore of the bay is composed of bold, granite serpentine and sandstone cliffs round to the mouth of San Luis Obispo Creek. T of this shore is broken by several gulches, but the principal break takes place at the creek lies north northeast (NNE.) one and a half miles from Whaler Island. The line of cliffs modified by the cuts for locating the railroad immediately on their face from the Port H wharf to the mouth of the creek. From Point San Luis the trend of the shore of the bay is by west one half west (N. by W. ½ W.) for one mile, then northeast by east (NE. by E.) for quarters of a mile to the creek, whence it assumes a general easterly direction for two miles, trending however to the southward.

The *East Point* of San Luis Obispo Bay lies north eighty-two degrees east (N. 82° E.) miles from Whaler Island. It is a low bluff point of thirty to forty feet elevation, with height behind it for one-quarter of a mile, then rises rapidly to a scrub-covered hill nearly nine dred feet high. Off this point lie one or two rocks hereafter mentioned. East of the mouth San Luis Obispo Creek, the shore line is low and sandy (backed by marsh) for a quarter of a the collection of buildings forming the town of *Avila*, from which the "People's Wharf" was out, but has since been washed away. Eastward of Avila the shore line is rocky and bluff mile eastward of San Luis Obispo Creek is a slightly jutting, rocky point, behind which is on the west shore of which is a wharf and warehouse known as *Mallaghs Landing*, but now abandoned as such. Thence to the east southeast towards East Point the coast-line is borde masses of kelp extending to, and in patches beyond, the five-and-a-half fathom line, and n gerous by several rocks.

The Hydrography of San Luis Obispo Bay and the immediate approaches shows that al face of the Monte del Buchon eastward of the Pecho Rock the twenty-fathom line of soun about two miles from the shore; and in the bay the depth ranges from ten fathoms on the o its of the bay to three fathoms within less than one quarter of a mile from the shore, with ception of the dangers in deep water. Approached from the southeast, the twenty-fathom lies three miles southeastward from Whaler Island, and as far from the north eastern sho the westward of Point San Luis the soundings indicate rocky bottom, with coarse gravel shells, barnacles, etc., especially in the vicinity of the Santa Rosa Ledge and the Westdal To the eastward of the meridian of the point the bottom changes to fine gravel, sand, and mud. East of the reef off Whaler Island the bottom is rocky to ten fathoms depth.

Dangers.—The known dangers in the approaches to the bay, and within the bay, are as f

IN THE APPROACHES.

The Pecho Rock is an islet of considerable size, really composed of one large and two rocks, rising thirty-one feet above the water. It lies three and one-sixth miles to the westw Point San Luis, and half a mile off the nearest shore. South seventy-six degrees east (S eight hundred yards from it lies a small rock just awash at high tide; and north seve

* This hut was still standing in 1885.

Monte del Buchon. Point Buchon. Lion Rock, 112 feet, SE. by E. ½ E., distant 8 miles.

Point Buchon, distant 1 mile. Monte del Buchon. Lion Rock, 112 feet. SE. by E. ½ E., distant 3½ miles.

Lion Rock, 112 feet, distant 2½ miles. Monte del Buchon. Pecho Rock, 31 feet, E. by S., distant 6 miles.

degrees east (N. 72° E.), distant six hundred yards, lies another small rock a few feet above water. These rocks, as well as the Pecho Rock, have from six to seven fathoms of water immediately [illegible] them; but between, and inshore of them, are several rocky patches, marked by scattered [illegible]aving from ten to fifteen feet of water upon them.

When a vessel is a mile eastward of the Pecho Rock it shows under the pyramid hillock, and then the Lion Rock shows as the outermost of three whitish rocks close under the shore.

From the Pecho Rock to the Whistling Buoy the course is west by south half south (W. by S.) four and a quarter miles in from ten to seven fathoms of water, and passing inside [illegible]nta Rosa Ledge.

Santa Rosa Ledge.—This danger has but eighteen feet upon it, and lies half a mile north-[illegible] quarter north (NW. ¼ N.) from the Westdahl Rock, where the buoy is placed. It is one [illegible] thirds miles south sixty-eight degrees west (S. 68° W.) from Whaler Island, and two miles [illegible] nine degrees east (S. 59° E.) from the Pecho Rock; it lies nearly one mile broad off [illegible]ore. There is dangerous ground in its vicinity for one-fifth of a mile with only four fathoms. [illegible]s here in heavy weather and the locality is marked by a few strings of scattered kelp. [illegible]oth weather the boiling of the water will indicate its presence.

Westdahl Rock and Buoy.—This is a sunken, isolated, bayonet rock having but eighteen [illegible]ater upon it. It lies one and six tenths miles south forty-seven degrees west (S. 47° W.) [illegible] Whaler Island, and south fifty-four degrees east (S. 54° E.) two and a half miles from the [illegible] Rock. It is nearly one and a quarter miles off the northern and nearest shore. It has [illegible] of from seven and a half to fourteen fathoms of water close around it, and is not marked [illegible] kelp. The sea seldom breaks upon it even in heavy weather, and it must be a sharp-[illegible] rock.

To mark this danger the Light-House Board has (1884) placed a *first-class nun buoy, painted* [illegible] numbered 1, one hundred and seventy-five yards southwest by south (SW. by S.) from [illegible] in twelve and a half fathoms of water over rocky bottom. From Whaler Island it bears [illegible] forty-seven degrees west (S. 47° W.), distant one and five-eighths miles. It must be left [illegible]rt hand when a vessel is going south, and on the starboard hand when she is going [illegible] From this buoy the Whistling Buoy bears N. 84° E. distant two miles.

[illegible]e absence or temporary derangement of this buoy, which also serves as a mark to avoid [illegible] Rosa Ledge, a vessel coming from the northwestward may clear these dangers by [illegible] the Lion Rock, which lies between Point Buchon and Point San Luis and about six miles [illegible] the latter, open one diameter from the point of land showing farthest to the westward, [illegible] first whitish, rocky bluff east of Avila opens to the eastward of Whaler Island, when [illegible] may be changed to clear the reef off Point San Luis. In clear weather the captains [illegible]ing steamers generally prefer to run inside these ledges and about one quarter of a [illegible]de the visible rocks, where a uniform depth of from seven to ten fathoms may be had.

[illegible] southern edge of the Lion Rock on with the northern edge of the Pecho Rock furnishes [illegible] to range for running inside of these dangers.

[illegible] off Whaler Island has already been described in giving the description of that islet. [illegible] 108.)

DANGERS IN THE BAY AND BUOY.

Howell Rock.—This is a sunken rock with only fourteen feet upon it. It lies north [illegible]even degrees east (N. 77° E.) nearly one and three-eighths miles from Whaler Island, [illegible]ere stands well out towards the middle of the bay. This danger is marked by a bunch [illegible]which, however, frequently washes away during heavy winter storms. It has from eight [illegible]thoms immediately around it, and is especially dangerous to vessels approaching the [illegible]om the southward.

[illegible]oid this danger keep Pecho Rock open with Point San Luis until the town of Avila [illegible]h, then steer for the wharf or anchorage.

[illegible] Light-House Board has (1884) placed a *second class can-buoy, painted red and numbered 2,* [illegible]red yards south southwest (SSW.) from the rock to mark this danger. It lies in nine [illegible] fathoms of water over a bottom of sand, broken shells, and mud. From Whaler [illegible] bears east half north (E. ½ N.), distant one and three sixteenths miles. It must be left [illegible]rboard hand when a vessel is entering the bay. From this buoy the Whistling Buoy [illegible]s S. 20° W., distant one mile.

A sunken rock, with seventeen feet of water on it, lies one mile north twenty-nine degrees east (N. 29° E.) from Whaler Island, or three-eighths of a mile off the point to the westward of the mouth of the creek. It has from five to five and a half fathoms immediately around it and is marked by a bunch of kelp.

Avila Rock, seven feet above water and one quarter of a mile off the shore, lies north fifty-four degrees east (N. 54° E.), distant one and five-eighths miles from Whaler Island. Two or three patches with fifteen feet of water lie just outside this rock in the kelp, bearing southwest by south (SW. by S.), distant one hundred and sixty yards from it.

This rock was formerly known as Black or Sunken Ship Rock from its long, low, narrow, black appearance, with one end standing higher out of the water like the bow of a wrecked vessel.

White Rock, thirty yards in extent and sixteen feet above water, lies north sixty-nine degrees east (N. 69° E.), two and one-fifth miles from Whaler Island. It has five and six fathoms of water close under its south side, but several rocky patches, with and without kelp, lie from south-southeast to southwest (SSE. to SW.) from this rock and within one-half mile of it, having from three and a quarter to four and three quarters fathoms of water upon them.

Bird Rock, seven feet above water, lies north eighty-seven degrees east (N. 87° E.), three and a half miles from Whaler Island, and half a mile from the shore off East Point. It has five and six fathoms close around it.

On the first Coast Survey charts it was known as Seal Rock.

A sunken rock, with twelve feet of water upon it, lies south sixty-four degrees east (S. 64° E.), two thirds of a mile from Bird Rock, or south eighty seven degrees east (S. 87° E.), four and one-fifth miles from Whaler Island, and three-quarters of a mile off the shore. This danger should be especially guarded against in approaching the Pismo Landing.

SAILING DIRECTIONS.

In making San Luis Obispo Bay from the northwest, with the summer winds, vessels should give Point San Luis a berth of half a mile, passing the reef not closer than three hundred yards on the port hand in six or seven fathoms of water, as a sunken rock with sixteen feet on it lies one hundred and thirty yards south-southeast (SSE.) from it. After passing the reef, if bound for the Harford wharf, haul close on the wind and, if necessary, make a short tack so as to anchor close enough to the wharf to run a line to it. In winter, anchor far enough out to clear the reef if southeaster should spring up. If caught, get close under the land near the North Whaler Rock as elsewhere suggested.

The coasting steamers bound southward in thick, foggy weather try to make the Lion Rock and then the Pecho Rock, if practicable; if they do not see them they run their courses and stand to fetch the *Lone Black Rock*, one-fifth of a mile from the cliff, and a little over three quarters of a mile west by south (W. by S.) from Whaler Island. This small rock lies in six fathoms of water and from it the vessels follow the outline of the point and reef in seven and eight fathoms of water.

In the broad bight of this bay, coasters from the southward during summer winds can work up to the anchorage in comparatively smooth water, carrying ten fathoms of water one and a half miles off shore and three fathoms within a quarter of a mile of the beach. It is advisable, however, to keep outside of the line of kelp and the vicinity of the sunken rocks described above.

Anchorage in Winter.—The bay is an open roadstead, exposed to the southern gales of winter, and even during heavy northwest weather a bad lateral swell rolls in, rendering it an uncomfortable anchorage. But close under Point San Luis the outlying rocks and reef break the southwester swell, and the high land appears to prevent the winter winds from blowing home, because the coasting steamers have there laid out heavy southeast gales. For this purpose a vessel should run close under the land north of the point and anchor in from three and a half to four fathoms water over soft sticky mud, with the outer rocks of the reef bearing south southeast (SSE.), the eastern of Whaler Island bearing south three-quarters west (S. ¾ W.), and the middle of the inner, or Boat Whaler, rock bearing southwest (SW.), distant three-hundred yards; this latter is the nearest land. Vessels have difficulty in getting their anchors. The old hide droghers used this anchorage before 1849. Landing was formerly effected in the mouth of the creek, but freight and passengers are now transferred to the wharf where vessels moor alongside.

Port Harford.—The westernmost, and now (1887) the only, landing in San Luis Obispo Bay, locally called Harford Wharf or Port Harford, and lies two-thirds of a mile nearly north-

west NNW.) from Whaler Island. It projects six hundred yards in a southeast direction from the high bluff shore, and has a depth of twenty feet of water at its extremity. It is built in a substantial manner, and vessels frequently lie moored on its inner or western side during southeast storms. There is a large warehouse at the outer end and another about half-way in its length. In busy seasons three or four steamers and two or three schooners are here loading and discharging at the same time. There is a strong undertow at the wharf, which makes the berth of vessels uneasy, and at night, or when loading or discharging is not carried on, they generally slack away from the wharf twenty or thirty feet and haul out towards the breast moorings which lie off it.

Freight and passengers are transferred directly from the steamers to the cars of a narrow-gauge railroad which winds along under the faces of the high white cliffs to the San Luis Creek, thence through the valley of the creek to San Luis Obispo and continuing for thirty miles to the coast eastward through the Santa Maria Valley.

BELL BUOY OFF POINT SAN LUIS.

To aid in finding and entering the bay in thick and foggy weather there has been placed a bell buoy in fourteen fathoms of water at a distance of one and one-fifth miles southeast from Whaler Island and one and three fifths miles southeast by south (SE. by S.) nearly from the end of the Harford Wharf (1886). It is sounded by the action of the sea.

From this buoy Whaler Island, off Point San Luis, bears north forty-four degrees west (N. 44° W.) one and one fifth miles; Harford Wharf, north thirty-three degrees west (N. 33° W.) one and three fifths miles, passing two hundred and fifteen yards inside the reef; and Pecho Rock bears west by north half north (W. by N. ½ N.), distant four and a quarter miles. The bearing to Point Arguello whistling buoy is south twenty-one degrees east (S. 21° E.) and the distance thirty-two and one-quarter miles.

The Westdahl Rock buoy bears south eighty-four degrees west (S. 84° W.), distant two miles, and the Howell Rock buoy north twenty degrees east (N. 20° E.), distant one mile.

From Point San Luis the following bearings and distances are given to prominent objects:

Point Arguello	S. 23½ E.	35 miles.
Point Buchon (not intervisible)		9½ miles.
Piedras Blancas Light-house, (not intervisible)		40 miles.
Point Sur (not intervisible)		90 miles.

San Luis Obispo Bay, Souza Rock, and Whistling Buoy.—This hidden danger is a discovery made in November, 1888. During the survey of 1872 a search was made for it by the party guided by the fisherman who reported it but who failed to recover it.

It lies in water of twenty fathoms, where the bottom of sand and broken shells is very regular. The top is small in extent and the sides rise very steeply to within sixteen feet of the surface. The danger has two heads, between which is a depth of ten fathoms of water. They are covered with great barnacles.

It is located by the following bearings and distances: Pecho Rock, northwest by west seven-eighths west (NW. by W. ⅞ W.) distant four and three quarters miles; right tangent of top of Whaler Island, in range with Barchill, eleven hundred and eighty three feet elevation, northwest one quarters north (NW. ¾ N.) two miles; Port Harford Wharf, northwest by north one quarter north (NW. by N. ¼ N.) two and a half miles, and this line passes tangent to the east side of the reef off Whaler Island at one and five-eighths miles; White Rock (in line with fence from beach through valley) scant north-northeast (NNE.) a little over two and a half miles.

Whistling Buoy.—This buoy is moored southwest by west (SW. by W.) one hundred and forty yards distant from the Souza Rock in twenty-one fathoms of water. Vessels entering San Luis Obispo Bay from the northwest are advised to enter by keeping this buoy on the starboard hand.

From the buoy we have the following bearings and distances to hidden dangers: Southeast point of Whaler Island reef northwest by north (NW. by N.) one and five-eighths miles; the Westdahl Rock, eighteen feet, west by north one quarter north (W. by N. ¼ N.) two and one-quarter miles; the Santa Rosa Rock, eighteen feet, west northwest, scant (WNW.), distant two and seven-eighths miles.

The hydrographic examination of this bay and the approaches in 1872 was very thorough, and the regularity of the bottom was noticeable with a uniformly clean bottom of mud, sand

and mud, and sand and broken shells except in a spot about one hundred and fifty yards from the rock, where it is noted "rocky."

The rock is named after the last fisherman who found it.

A preliminary chart of San Luis Obispo Bay was published by the Coast Survey in [illegible] later editions have been published to embrace the results of the thorough sounding out [illegible] harbor.

We have been informed (1851) by old otter hunters on this coast that there exists a [illegible] rock about eight miles south-southwest (SSW.) from Point San Luis, and furthermore that [illegible] had found kelp upon it in four fathoms of water. On the old Spanish charts an island [illegible] laid down in that direction, but distant about eight leagues. On Tebenkoff's chart is [illegible] "doubtful island from Spanish charts" fifty-one miles south sixty-nine degrees west (S. 69° W.). But in this meridian the one-thousand-fathom line of sounding is fairly well fixed; and the one hundred and sixty two fathom sounding is only sixteen miles to the northwest by north (NW. by N.) of this position. One of the Pacific Mail steamships lay to in a southeast gale and thick [illegible] off Point Concepcion, and drifting to the northward came unexpectedly upon a sunken [illegible] upon which the sea was breaking heavily. The commander supposed the vessel to be [illegible] Point Sal, and had so plotted the rock upon his chart, but upon being informed of the existence of a rock off San Luis Obispo, he was satisfied that he had been near it, but unfortunately had no opportunity of determining his position.

This locality demands a thorough examination, as it is in the direct track of the Mexican Panama steamers running to and from San Francisco. The whaling company at Point Sal have never discovered any signs of this reported rock, and a line of soundings run to the [illegible] position shows fifty six fathoms water in the vicinity. This depth is, however, much less than average at that distance off shore.

The geographical position of San Luis Hill, three-quarters of a mile north sixty degrees [illegible] (N. 60° W.) from Whaler Island, is:

Latitude	35	10	00	north
Longitude	120	45	38	west

The Coast and Geodetic Survey secondary astronomical station was on Fossil* Bluff [illegible] east side of the small fresh-water stream west of the creek, and its geographical position is:

Latitude	35	10	37.5	north
Longitude	120	44	33	west
Or, in time	8h	02m	58s.2	

The magnetic variation was 15° 27′ east, January 1, 1885, with a yearly increase of [illegible] one-tenth feet.

Tides.—The Corrected Establishment, or mean interval between the time of the moon's [illegible] and the time of high water, is 10h 8m. The mean rise and fall of tides is three and [illegible] feet; of spring tides, four and eight-tenths feet; and of neap tides, two and four tenths [illegible] The mean duration of the flood is 6h 25m, and of the ebb 5h 58m. The average difference [illegible] the Corrected Establishments of the a. m. and p. m. tides of the same day is 1h 24m for high [illegible] and 1h 0m for low water. The differences when the moon's declination is greatest are 2h 0m [illegible] 28m, respectively. The average difference in height of these two tides is one and one half [illegible] the high waters, and two feet for the low waters. When the moon's declination is greatest [illegible] differences are two feet and three and one tenth feet, respectively. The average difference [illegible] higher high and lower low waters of the same day is five and four-tenths feet, and when the [illegible] declination is greatest, six and one tenth feet. The higher high tide in the twenty-four [illegible] occurs about 9h 32m after the moon's upper transit (southing), when the moon's declination [illegible] and about 2h 54m before, when south. The lower of the low waters occurs about seven hours [illegible] the higher high tide. The greatest observed difference between the two low waters of the [illegible] was four feet, and the greatest difference between the higher high and the lower low water of the [illegible] day was eight and three tenths feet.

To find the times of high and low waters, first compute them from San Diego, and to the [illegible] thus obtained add 35m for San Luis Obispo. The heights are the same as San Diego.

The town of San Luis Obispo, which takes its name from the mission of that name [illegible] September 1, 1772, is not on the bay, but is situated about ten miles in the interior in the [illegible]

*In the coarse sandstone between San Luis Creek and the arroyo near the astronomical station gigantic [illegible] remains were found.

Point Buchon, NW. by N. ¼ N., distant 4½ miles.

Monte del Buchon.

Lion Rock, 112 feet

Lion Rock.
NW. by W. ¼ W., 2¼ miles

Pecho Rock, 31 feet, distant 1½ miles.

Monte del Buchon.

Lion Rock, 112 feet.
NW. by W. ¼ W., 3¾ miles

Red Bluff.

Monte del Buchon.
Taken when abreast Pecho Rock, distant ¼ mile.

of an extensive and excellent grazing country. It is connected with the port by railroad, which gives access into many of the adjacent valleys.

The bay is named the Ensenada Roque on Vizcaino's chart.

Coast line of Monte del Buchon.—To the northwest of the Bay of San Luis Obispo rises to a height of eighteen hundred and thirty three feet the mountainous mass known as the *Monte del Buchon*,* which is readily distinguished in coming from the northward and southward, because the land falls away behind it and thus leaves it somewhat isolated. Its features as a landfall have already been described (see San Luis Obispo Bay). The seaward face of rocky cliffs looks to the south southwest and has a border of table land about two hundred yards wide and from forty to sixty feet elevation, except immediately round Point San Luis and the Bay of San Luis Obispo. Its shore is bordered by rocks which in some places extend out half a mile. The hills rise rapidly behind the border of table-land and are cut by deep gulches opening upon the sea. A curious feature close along the edge of the table bluff is the rising up of rocky outcroppings, sixty to eighty feet above the general level. The first two of these lie close together north by east (N. by E.) from the Pecho Rock, and are eighty five and sixty-eight feet above the general level of the bluff. The eastern and lower of the two is known as Pillar Rock, and its sides are almost perpendicular. The second, rising ninety feet, is one mile eastwardly from the Lion Rock, and two rocky islets close under the cliffs just west of this hillock are one hundred and eighty feet above the water, or nearly twice as high as the immediate bluff. The third hillock is double, rises sixty feet above the table-land and lies only one-third of a mile north of Lion Rock.

The northwestern part of Monte del Buchon is very plainly marked by three horizontal terraces having several hundred feet difference of elevation. No other point on the coast is more decidedly marked.

From Point San Luis the coast tends in a straight line west northwest (WNW.) for a distance of eight miles under the flank of Monte del Buchon, and close along the shore of this stretch are several large rocks hereafter described.

One of the marks along this shore, in clear weather, is the Pecho House. It is a white, moderately large, building on the grassy mesa, about two and a half miles west-northwest from Point San Luis. The cliffs under it are white and about forty feet high. The house lies one and a fifth miles east-northeast from the Pecho Rock.

Point Buchon.—This is the termination of the west-northwest (WNW.) trend of the coast from Point San Luis and forms the northwest spur of the Monte del Buchon. The extreme point is a cliff nearly forty feet high, slightly overhanging, with low table-land behind it gradually rising to one hundred feet in one-third of a mile, and thence rapidly to twelve hundred and sixty feet in a little more than one mile from the point. It has a few visible low rocks close under the cliffs, and sunken rocks and breakers extending out one-quarter of a mile, with patches of kelp.

The outermost known *danger* is a sunken, sharp-pointed rock seven hundred and seventy-five yards southwest three quarters west (SW. ¾ W.) from the point, with three and three-quarters fathoms upon it. It is not marked by kelp.

On the north side of the point, one-third of a mile distant, is the opening of Valencia Creek, a small stream coming through a sharp gully and gorge.

To the south southeast (SSE.), about half a mile from the point, is a bluff point twenty-five feet high, frequently mistaken for Point Buchon by the coasting steamers when closely following the shore in thick weather, but it is marked by a slight hillock about ten feet above the otherwise flat surface. Point Buchon does not show double when made from the northwest, but when a vessel is a little to the eastward it shows double; and the eastern point is a little farther out and a little higher, with a slight depression or neck behind it, and then two slight hillocks on the slightly rising mesa. It overhangs as well as the western point, but more so. There are fewer rocks off the eastern projection. The high land rising sharply immediately behind this second point pro-

* The name appears in De Mofras, p. 384. ** The anchorage of San Luis is distant three leagues from the Mission. It is so named because the chief of the tribe which lived [illegible] which carried an enormous goitre. The mountain is conical and is detached from the chain which follows [illegible] This description of Mount Buchon seems to be drawn up from what he saw at the anchorage in the Bay of San Luis Obispo. It is not a single conical mountain, but a mass of mountains about ten miles in length by about [illegible] *Monte del Buchon* is referred to by Vancouver, November 8, 1793, as being the name already bestowed by [illegible] mountain "in the printed chart" of Quadra (Vancouver, Vol. II, p. 146.) The name Sierra del Buchon is [illegible] and in the chart of Miguel Constanzo, published in Mexico October 30, 1770. He has the ridge hachured, and [illegible] a large rock off the middle of the ocean face.

jects further out than the high land back of Point Buchon, and is the part of the cape fi
from a distance to the southward or northward. The south-southwest face of this high
the height of the crest line, is conspicuously white, and is thereby readily recognized. Wh
from the southeast by east (SE. by E.) from thirty miles, it rises up prominently; and
weather the high mountains of the Santa Lucia range are seen beyond and to the westw
But when the cape is seen from the northwest this white appearance is not exhibited.

The geographical position of Point Buchon, as determined by the U. S. Coast and
Survey, is:

Latitude	35° 15′ 12.5″ north
Longitude	120° 54′ 01.3″ west
Or, in time	8h 03m 36.1s

The magnetic variation at Point Buchon for January 1, 1885, was 15° 28′ east, with an
increase of 1′.1.

From Point Buchon the high Saddle Peak of the mountain lies south eighty five deg
(S. 85° E.) distant five and a half miles, and Point Esteros bears north nineteen degrees
19° W.) distant twelve and one third miles.

Under the cliffs *between Point San Luis and Point Buchon* are numerous rocks close
with one or two lying some distance out.

The Pecho Rock.—The first of these is the Pecho Rock, which has already been describe
Dangers, San Luis Obispo Bay.

The Lion Rock.—The most conspicuous is the Lion Rock, so named from its resemb
lion couchant. The rock shows the head remarkably fine when it bears about east-south
herd of sea-lions occupies the southwest flank of the rock, and their excreta gives to tha
the rock its white appearance. It lies six hundred yards from the edge of the bluff, two
thirds miles southeastward from Point Buchon. It is four hundred and forty yards lon
west and southeast, and one hundred and twelve feet high, with a second high rock be
and the shore. The bluff north of it is only fifty feet high, but a hillock rises to one hun
eighty one feet just inside the edge of the bluff, with a depression of eighty feet behind
and one quarter miles eastward of this rock there is another hillock of one hundred an
seven feet elevation on the verge of the bluff, with a depression of ninety feet behind
peculiar formations have already been referred to.

Two hundred yards west of the Lion Rock lies a low rock twenty yards in extent,
water outside it.

There are some huts in a gulch abreast the Lion Rock, with green serpentine cliffs a
gulch. The fishermen anchor their boats off this gulch.

From Lion Rock the high "Saddle Peak" of Monte del Buchon lies north seven
east (N. 70° E.) distant four miles.

(See views which embrace Point Buchon, Lion Rock, Pecho Rock, and Point San L

Hydrography off the sea face of Monte del Buchon.—The soundings off San Luis O
and Point San Luis have already been given. Along the whole face of the cliffs from
Luis to Point Buchon there is about ten fathoms, half a mile off shore. Abreast the Po
which is two and one third miles to the westward of Point San Luis, the hydrography
teen fathoms at one mile; twenty four at two miles; thirty-four at three miles, and fo
four miles, thus increasing ten fathoms for each mile seaward.

Abreast of Lion Rock there is deep water close to the outer cliffs; nineteen fathom
the south southeast (SSE.) at half a mile from shore; twenty five at one mile; forty o
miles, and fifty eight fathoms at three miles. There is kelp and other rocks inside the l

Abreast of Point Buchon and the adjacent point to the southeast, and stretching to
ward, there is irregular, rocky bottom of ten to twenty fathoms at half a mile, with k
shore; regular bottom of twenty eight fathoms at one mile; forty-eight fathoms at two m
fathoms at three, and seventy fathoms at three and a half miles.

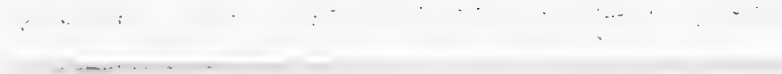
Off Point Buchon to the west-southwest (WSW.) the depth is twenty-five fathoms at
sixty fathoms at three miles, and eighty fathoms at four miles.

In running along the seaward face of Monte del Buchon from the southeastward
north by west three quarters west (N. by W. ¾ W.), one-quarter of a mile outside the Po
will clear the Lion Rock the same distance, and also the small intervening rocks lying off

Deep-sea soundings off Point Buchon.—From Point Buchon a line of deep-sea sound

Breaker.

Low part of Point Buchon, North 1½ miles.



Monte del Buchon, 1,700 feet.

El Morro, 573 feet, NE. by E., 7¼ miles

In hazy weather

Buchon. North 1¼ miles.

) feet.

Point Buchon, SE. ¼ S., 12 miles.

In hazy weather

to the westward for ninety-two miles to the deep plateau of the Pacific on December 24 and [illegible]. The descent from the coast plateau is quite sharp, as will be seen from the following [illegible] which exhibits these results; the first sounding is taken about three and a half miles west [illegible] Point Buchon:

Latitude	Longitude	Depth	Character of bottom
[illegible]			

[illegible], with the other deep-sea soundings off Point Concepcion, indicate that the one thousand- [illegible]ne is only forty miles, and the two thousand fathom line forty-six miles off shore.

ESTEROS BAY

Between Point Buchon, already described, and Point Esteros, which lies twelve and one-third [illegible] in nineteen degrees west (N. 19° W.) [illegible] coast falls back to the eastward for five [illegible], forming a broad bay, open to [illegible] high boundaries on the southeast and [illegible] and low lands on the [illegible] northeastward. In this bay is the landing [illegible] behind the Morro, with [illegible] anchorages in the northeast part. There is [illegible] throughout the bay, and a depth of ten fathoms is carried within half a mile of the [illegible].

From Point Buchon the coast for [illegible] the southeastern shore of Esteros Bay is the northwest [illegible] Point Buchon. It trends abruptly to the [illegible] for about eight miles to the high, conical [illegible] El Morro, close under the [illegible]. Three miles northward of Point Buchon the [illegible], and a sand beach, backed by sand-dunes, begins and runs to the Morro. The face of the [illegible] of Point Buchon rises from fifty to a little more than one hundred feet high; it is closely [illegible] by rocks, and marked by an indentation one third of a mile from Point Buchon, where a [illegible] stream, called the Islay or Valencia Creek, opens upon a contracted cove. Half a mile off the [illegible] for half a mile north and south, are detached fields of kelp. Within less than a mile from [illegible] end of the cliffs, and a quarter of a mile from the ocean, lies the southern reach of Morro [illegible] and the ridge one hundred feet high, [illegible] sand dunes. This ridge forms bluffs [illegible] shore of Morro Bay which decrease in elevation to the northward and disappear in two [illegible].

El Morro.—This is a [illegible] high, conical, [illegible] islet, nearly six hundred yards in extent and [illegible] and seventy-[illegible] feet elevation. It is a very marked feature in the bay and ap- [illegible] and is the [illegible] lowest one [illegible] of [illegible] rocky peaks, ten or twelve in number, [illegible] degrees W. from the middle of the valley towards the ocean. [illegible] [illegible] parts bear nearly on the same bearing under the water of Esteros [illegible].

[illegible] El Morro and the [illegible] is known collectively as Morro Bay, and the [illegible] [illegible] the northern shore is rugged and guarded [illegible] [illegible] point of Morro [illegible] 116, '75.

El Morro [illegible] shore [illegible] a quarter of a mile for six miles to the anchor- [illegible] and thence five miles [illegible] Esteros. The northern shores of the bay [illegible] Bluffs; the low and [illegible] backed by mountains.

[illegible] Esteros there is a large

[illegible] Morro's Rock, 1602, has the bay and the Morro [illegible].

[illegible]

depth of water, but no extraordinary depths have been reached as in the submarine v
Point Hueneme, Carmel Bay, etc. There is a good depth of water throughout the ba
known dangers over half a mile from the shore.

Following the coast line to the northward from Point Buchon, the depths decrease s
eight and nine fathoms at half a mile from shore; reach sixteen and seventeen at one
thirty fathoms at two miles. Abreast the beach, towards the Morro, the depth is seven
half a mile and fifteen fathoms at one mile, with gradual and regular decrease outside
Morro there is a depth of fifteen fathoms at one mile off the sand beach, twenty six fathe
miles, and thirty eight at three miles. Within a mile of Cayucos the depth increases
from the beach to ten fathoms at one mile and seventeen fathoms at two miles. Are
Cayucos to the westward for three miles there is a depth of ten to eleven fathoms at o
shore, and twenty-two at two miles. But along this stretch, and all the way to Point I
shore is bordered by many small rocks above and below water, and the three-fathom
irregularly distant from the shore; it reaches nearly half a mile in places, with foul botto
danger, the Constantine Rock, elsewhere described, lies in the track of the coasting ste

Dangers in Esteros Bay.—A short reef of rocks extends one quarter of a mile off
four miles southeast of the Morro. The swell along the beach is generally heavy, but
ings along shore are very regular. There are many places where quicksand is found, a
in the channel to Morro Bay.

A sunken rock, with three fathoms water over it, is reported about one-third of a
southwest (SSW.) from the Morro, with eight to ten fathoms around it, but several sea
failed to discover it.

The *Constantine Rock* and the dangers at Cayucos and its approaches are described
head of *Dangers at Cayucos.*

MORRO BAY

Behind El Morro* lies Morro Bay. It is triangular in shape, with a base of three m
the ocean, south of the Morro, and its apex two miles towards the east. It is full of fl
principal stream emptying into it is the Chorro and its tributaries. The entrance t
on the north side of El Morro, and has only nine feet of water in it, although steame
eleven feet are reported to have entered, stirring up the quicksand bottom. It is ve
crooked, and close up to the walls of the rock. The tide rushes in and out with gre
and no vessel or boat should venture through with the full strength of the ebb. Und
circumstances vessels of light draught may enter on the last of the flood when there
swell outside, and the breakers off Pillar Rock are insignificant. Pillar Rock is a hig
hundred feet) sharp pointed rock, very small in extent, and lying about fifty feet fro
side of the Morro. It shows like a white sail close to El Morro under the afternoo
seen from Point Buchon, and even when north of the latter. As it comes on line
of El Morro the rock shows black, except a tip of white on the south side of the s
channel into the bay passes close along the north side of Pillar Rock, thence close
until about half-way along its northeast face, where there is a sunken rock with on
half feet of water upon it, and which is generally marked with a small buoy by
The channel in 1885 passed close to the port or north side of this sunken rock a
sharp turns, but is constantly changing. It is hazardous to enter without first ex
buoying the channel, unless a local pilot is employed.

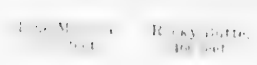
During the year 1887 the north channel into Morro Bay around the Morro was
new channel opened around the south and east side of the rock.

This channel is quite narrow, and a depth of nearly ten feet can be carried
enter this channel, run before the swell at a distance of fifteen or twenty yards
rock close under the southwest part of the Morro and continue under the Morro
over twenty yards until abreast the southeast part, and then follow the channel
The north side of the channel is steep-to, and it is not easy to get on it. Anchor
The signal for the pilot is three blasts of steam whistle, when flag will be
town to indicate pilot will come off so soon as tide and weather permit.

* See [illegible] page 11.
† Named Rock on [illegible] charts.

El Morro, 573 feet, SE. by E., 6 miles.

El Morro, E. by S., 15 miles, 573 feet. In hazy weather



Cayucos Landing, N. by W. 8 miles

Good anchorage for vessels outside is one mile off the heads opening the town to the south of
...rro.

...side the lagoon, at the landing, off the village called Morro City, there is a depth of eighteen
...a sunken rock, with only four and a half feet of water upon it, is reported inside the
...ce.

...ssels come out with more difficulty than they enter. With a westerly swell it is impracti-
...do either.

...venty years ago the passage was on the south side of El Morro, but changed about 1869.
...ble to change, but the normal opening is on the north side.

...ong the coast to the northwestward from the Morro there are no outlying dangers until
...ayucos, except a small patch of rocks awash situated about half a mile south-southwest
... of Willow Creek, which is a small stream emptying three miles northwest (NW.) of the
...

One mile southeastwardly from the outer end of Cayucos wharf lies the *Whale Rock*, sixteen
...h, two hundred yards from the low bluff shore. It is very near the mouth of *Old Creek*.

CAYUCOS LANDING.

This anchorage lies north twenty-one degrees east (N. 21° E.) twelve miles from Point Buchon,
...northeasternmost part of Esteros Bay, where there is a slight indentation in the low shore.
...this shallow bight a wharf has been built out to afford shipping facilities for the thriving
... of Cayucos. The village shows by its cluster of white houses apparently under and close
...high mountains, but really it is located at the mouth of a valley rising gradually towards
...s. The wharf stretches out to the south, and is nine hundred feet long, fourteen feet wide,
...creased width at the end, and is built quite high, as a protection against the winter swells.
...s a depth of fourteen feet of water at its extremity, and there are good mooring buoys to
...uth and east. Steamers lie on the east side of the wharf, head in, on a north by west bear-
...

In clear weather the houses of the village mark the general location of the anchorage. In
... foggy weather it is a dangerous locality to get into. All the adjacent hills are rolling and
...s, rising gradually as they fall back. One hill, about a mile to the westward of the town,
... an estimated height of one thousand feet. Another hill, a mile to the east, has the same
...

Coasting steamers carry freight here regularly and take away produce, but the anchorage is
...nded by reefs, and a local knowledge of the immediate vicinity is needed to reach the wharf
... anchorage with safety. Schooners bring lumber but now (1884) carry away no produce.

...om the end of the wharf to the Morro the bearing is south forty-five degrees east (S. 45° E.),
... four and a half miles.

Dangers at Cayucos and approaches.—For half a mile off the shore, and just west of the pro-
...tion of the wharf to the south, lies *foul ground*, marked in part by kelp and by breakers in
... weather. The eastern limit of this foul ground is about three hundred yards south of the
...nd is marked by a *white flag*, bearing south by west (S. by W.) from the wharf.

Another danger has been reported (May, 1885) near the white flag but not yet verified. It is on
... of the southeast corner of the wharf and the Morro, and two ship's lengths from the white
...

Mouse Rock.—There is also a sunken rock two fifths of a mile south of the wharf and on the
... the two mooring-buoys. It is called the Mouse Rock (formerly Morse Rock) and is marked
... *flag* just to the south and east of it. The flag bears south by east (S. by E.) from the
...

Steamers can enter between Mouse Rock (marked by the red flag) and the western breakers
... by the white flag) in five fathoms, but the channel-way is not over three hundred yards
...

If the red flag marking Mouse Rock should be temporarily deranged the course for clearing
... the range of the northwest corner of the wharf on with the southeast edge of a small
... of trees on the low hillside half a mile from the shore. There was a fence around these
... December, 1884). At night, when steamers are expected, a blue light is shown at that corner
... wharf, and a red light on this range, about one hundred and fifty feet back from the wharf.

These lights must be kept on range closely owing to the short distance between them . . . scant room in the channel.

The Mouse Rock is really a ledge; it does not break as a single sharp rock, but t heaves over it and breaks as rollers.

Metcalf Rocks.—Another danger is the Metcalf Rocks (formerly known as the Sku four hundred yards southeast (SE.) from the end of the wharf. It is a narrow ledge with pinnacle points, having nine to eighteen feet of water over them, and four and five around them. The ledge lies east and west, and is probably one hundred yards long. It by a *blue flag* at the *western*, and a *white flag* at the *eastern* end. From the wharf the w bears south forty two degrees east (S. 42° E.), and the blue flag south thirty-six degr (S. 36° E.).

Vessels can pass between the Mouse Rock and the Metcalf Rocks in five and six this is the usual channel); and close to the east of the Metcalf Rocks in four to five fath owing to the lately discovered danger mentioned above, this latter channel is not recom Two or three mooring buoys lie between the Metcalf Rocks and the wharf.

Constantine Rock.—This hidden danger lies in the track of vessels bound to Cayucos westward, as they generally keep quite close along the shore. It is a *double headed* roc ten feet of water on the western head and eight feet on the eastern head. They are sev yards apart and lie east northeast and south southwest from each other. When exam a depth of four fathoms of water was found between them, and six and seven fath around them on all sides. There was straggling kelp around this dangerous patch for dred yards in the line of the two. The depth of the water inside the rocks ranges three fathoms for four hundred yards, or half-way towards the shore.

The line of the north fence ranges almost exactly between the rocks, and the nort the warehouse at Cayucos is over the Black Rock.

It lies just half a mile off the rocky shores of Cayucos Point to the northward, bu third of a mile outside the rocky reef stretching towards it from the northwest. It three sixteenths miles south fifty three degrees west (S. 53° W. from the church steep neos; two and one sixteenth miles south fifty-five degrees west (S. 55° W.) from the not of the large warehouse at the shore end of Cayucos wharf; one and seven tenths miles degrees west (S. 70° W.) from Mouse Rock, which is marked by a red flag; and it south three and one ninth miles from Point Estero.

In clear weather the location of this danger can be more readily found by the fo ranges: a line of fence runs north and south one mile from the shore over the first about two miles to the westward of Cayucos, and the rock lies twenty-five yards to the the prolongation of that line. It is also almost on the range of Black Rock and th corner of the above mentioned warehouse at Cayucos wharf. Black Rock is the ou rock of a reef lying four hundred yards from shore nearly one mile west southwe from Cayucos wharf.

This is doubtless the rock upon which the coasting steamer *Constantine* struck since, but reported it two miles from shore where not less than twenty fathoms of wat

As far as the hydrographic survey has been carried to the westward of Cayuco northern shore of Esteros Bay, many sunken rocks with from ten to eighteen feet of them have been found outside the three fathom line, but none so far from shore as t time Rock. It is advisable, therefore, to give this shore a berth of at least three mile in running along it.

Constantine Rock buoy.—This danger has been marked by a *first-class can buoy* pa *black* horizontal stripes. It is placed six and a half fathoms of water one hund yards south of a part of the danger, having about sixteen feet of water upon it. W was located the eight and a half-foot point was not found.

Masters of vessels are advised not to pass between this rock and the shore.

CAYUCOS—BUOYS.

Mouse Rock.—A *second class can buoy*, painted *black* and *numbered* 1, has been moo fathoms of water, about forty yards southeast of the Mouse Rock.

A *black spar buoy* has been placed in five fathoms of water, between the black r 1 and High Bluff, off the eastern tail of a rocky ledge.

Metcalf Rocks.—A *red spar buoy* has been placed in five fathoms of water, off the western end of the Metcalf Rocks, on the east side of the entrance.

SAILING DIRECTIONS.

Coming from the direction of Point Buchon the best course in is north by west half west (N. by W. ½ W.) leaving the red flag marking Mouse Rock close to port, and the blue flag near the east end of the Metcalf Rocks to starboard.

Coming from the direction of Point Esteros, after clearing the Constantine Rock, steer northeast by east two thirds east (NE. by E. ⅔ E.) for the blue flag, until midway between the red flag marking Mouse Rock to starboard, and the white flag marking the extremity of the foul ground south of the wharf to port, when the wharf bears north, then steer for the wharf.

A set of signals has been arranged, for steamers approaching Cayucos, to indicate whether they shall come in or pass on. They are as follows:

In fair weather:

White flag.—Do not come in; nothing for you.
Red flag.—Send boat for (or with) passengers.
Blue flag.—You will require line to moorings; or come in and see for yourself.

When the weather is foggy:

Four bells.—Same as red flag.
Two bells.—Same as white flag.
Continuous ringing.—All right.

At night—

Single blue light.—Same as white flag.
Red and blue lights.—Bring lights in range and come in.

The captains trading to this port say that in winter strong northeast winds frequently blow off Cayucos, and that when they are fifteen miles outside they encounter the northwesters.

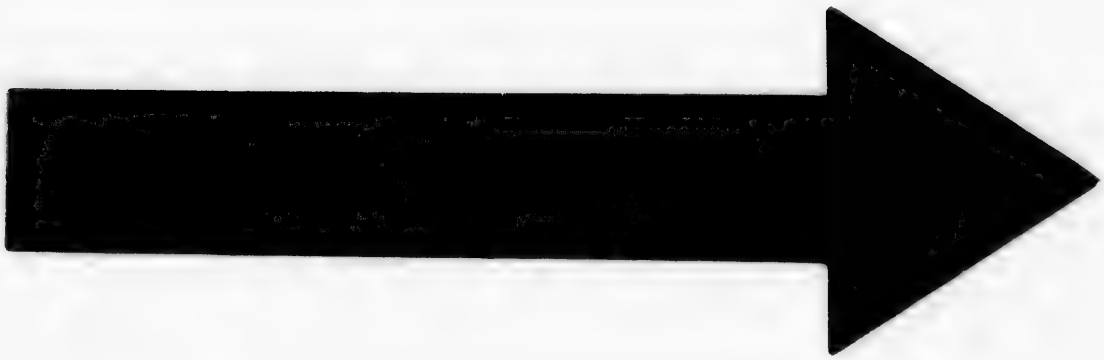
Two small streams enter Los Esteros Bay near Cayucos. The Rio del Estero empties about one hundred yards to the westward of the wharf, and the Cayucos Creek about one-third of a mile to the southeastward. Neither breaks through the beach except during freshets. The former is locally known as the Big Cayucos, and the latter as the Little Cayucos.

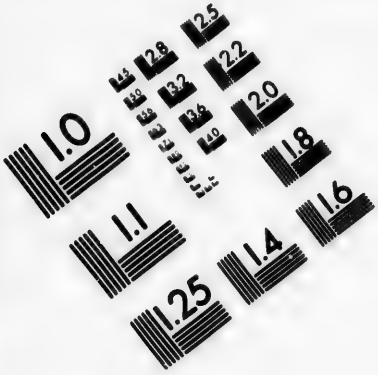
Cayucos is the Indian name for canoe, and this is one of the old stopping places of the early otter hunters.

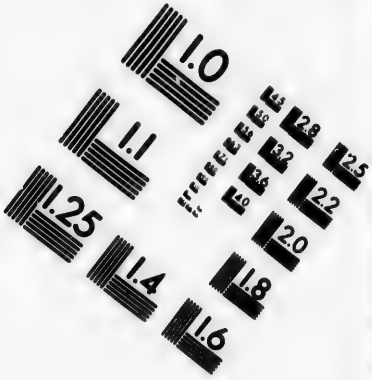
The *coast line from Villa Creek to Santa Rosa Creek*, ten miles, is composed of bluffs from forty to sixty feet above the sea, with sand and rock beaches, backed by a steep range of hills from three hundred to seven hundred feet above the sea. From *Santa Rosa Creek to San Simeon Bay*, six miles, the coast-line is composed of bluffs from twenty to thirty feet above the sea, with sandy and pebbled beaches, backed by rolling hills. A vessel stranded on this portion of the coast during the summer months would not have her crew exposed to any danger so far as effecting a landing. During the winter storms from the southeast and southwest the coast is exposed to the whole Pacific Ocean, and the beaches are very rough. Also, during a heavy northwest swell in summer the breakers are rough and dangerous for landing in small boats; the beaches are composed of hard sand and rock, and a vessel stranded in a heavy swell would go to pieces in a short time.

Pearl Harbor.—From Cayucos to Point Esteros the distance is four and four-fifths miles, following the general curving of the coast. But the two places are not intervisible because the shore east of the Constantine Rock projects well to the southward. The survey has recently been finished in this locality, and shows a retreating of the rocky coast in the first two miles eastward of Point Esteros, where Villa Creek enters at the western end of a quarter-mile stretch of clean beach backed by sand dunes. This is the only sand beach between Point Esteros and Cayucos.

Pearl Harbor is misnamed, for it is a very slight indentation in the rocky coast between Villa Creek and Point Esteros. It lies just half a mile northeast by east (NE. by E.) from the Point. The cliffs facing the cove are sixty feet above the sea and are cut by two deep arroyos. The breadth of the cove between the east and west cliffs is about four hundred yards, and the depth two hundred yards; but these measures are connected by patches of rocks which stretch out seventy-five yards from the eastern cliff and fifty yards from the western. There is no beach except a very narrow strip at low water. There are two clusters of rocks off this beach; one in the middle of the shore between the two arroyos, and the other off the western arroyo. Along the west-







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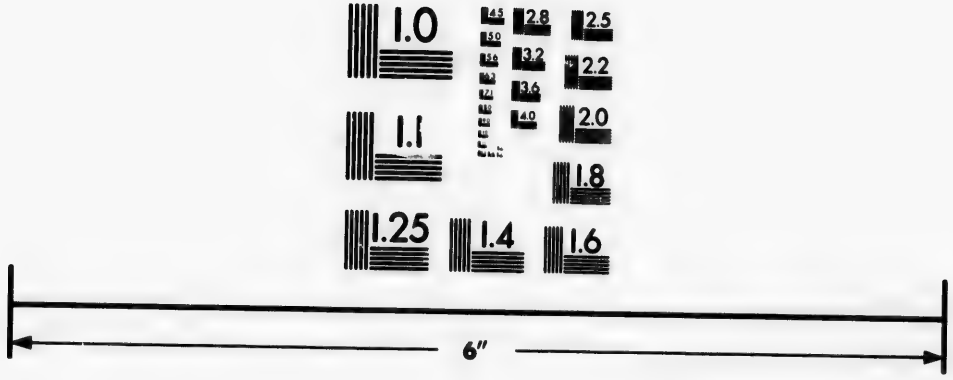

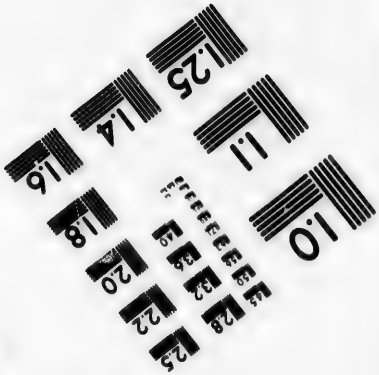

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ern shore for four hundred yards are many small, visible rocks, and a line of sunken rocks near parallel with the shore. The line is over one hundred yards in length and nearly one hundred yards off shore at the outer end.

Danger.—A sunken rock lies just outside the western side of the entrance, one hundred fifty yards from the shore. It lies south eighty-two degrees east (S. 82° E.) from the high (four hundred and thirty-four feet elevation) just abreast of it. From the eastern point of the it lies southwest (SW.), distant three hundred and thirty yards.

This cove is reported to be a fair shelter for small vessels, but not fit for large schoo The steamers report a wholesome dread of the place. Anchorage is had one eighth of a mi shore in three and a half fathoms of water. There is much kelp off this cove.

*Point Esteros.**—This is the first headland northwest from Point Buchon, from which it l northwest half west (NW. ½ W.) and is distant fourteen miles. It is a moderately high (five h dred and fifteen feet) flat-topped hill point, with rounding front cliffs fifty to ninety feet elev without table-land at the seaward face. When seen from the westward, the Morro is seen sta nine miles further to the eastward as a hay stack rock, with high, jagged mountains in the ground, showing between the Morro and the point. When seen from the southeast, it is onl tinguished by the cliffs under it, because the adjacent grassy hills are of the same height; b it are seen Rocky Butte and Pine Mountain of the Santa Lucia range, and farther to the west the high shoulder of Cape San Martin and the low points towards Piedras Blancas. W abreast of Point Esteros, on a course to the northwestward, it can not be distinguished exce the corrugated appearance of the western slope arising from transverse erosions on the sea face, but all covered with grass. If the weather is smoky the point will then come out in relief. When approached from the southward it can not be distinguished in moderately s weather, and the points to the northwestward are all low and indistinguishable at six miles the shore. Coming from the northwestward it shows as a long table land about five hundred high, and under certain conditions of light the corrugations mentioned above are very ma On the north side of the second corrugated ridge, reckoning from the point, there is quite a s valley. When the point is seen from the east-southeast, coming out of Cayucos, it shows a high, western termination of the coast hills, with a very steep slope to the water, and the rocks abreast of the Constantine Rock nearly in line with it. There are no trees upon the for several miles to the northward.

When rounding Point Esteros in coming from the northwestward on a clear morning, sunrise, the country to the northeastward, forming the first ridge of hills to the northw Esteros Bay, presents an extraordinary rolling appearance; but when this ridge is seen bro from the southward it looks like a series of grassy hills seamed by gulches.

There is deep water close under Point Esteros, and vessels round it close aboard, alt some of the steam ship captains think there are dangers around it. No visible rocks ext thirty yards from it, but kelp stretches out an estimated distance of three-quarters of a n along the southwest side of the Point Esteros ridge. The hydrography has not yet been fi on this section of the coast.

The geographical position of the extremity of Point Esteros, as determined by the U. S. and Geodetic Survey, is:

Latitude	35°	27′	30″ north.
Longitude	120°	59′	53″ west.

From Point Esteros we have the following bearings and distances to prominent points:

Point Arguello	S.	33½°	E. distant 55 miles.
Point Buchon	S.	19°	E. distant 12¾ miles.
Piedras Blancas Light-house	N.	63½°	W. distant 31½ miles.

BAY OF SAN SIMEON AND APPROACHES.

From Point Esteros to the western point of the anchorage of San Simeon the coast runs straight northwest by west (NW. by W.) for a distance of fifteen miles, and there is no inde to afford anchorage except at the extreme northern part. The shores are not so bold as the farther to the northward or to the southward, and the mountains fall well back, from five to miles, leaving a fine rolling country of no great elevation and well suited to agriculture.

*Called Punta de los Esteros on the old Spanish charts. It was named Punta del Esteros on Quadra (Vancouver Vol. II, p. 446.)

Point Esteros, 515 feet,
E. ¼ S., 4¼ miles.

Ridge, 515 feet,
Point Esteros, East 1

Very hazy weather.

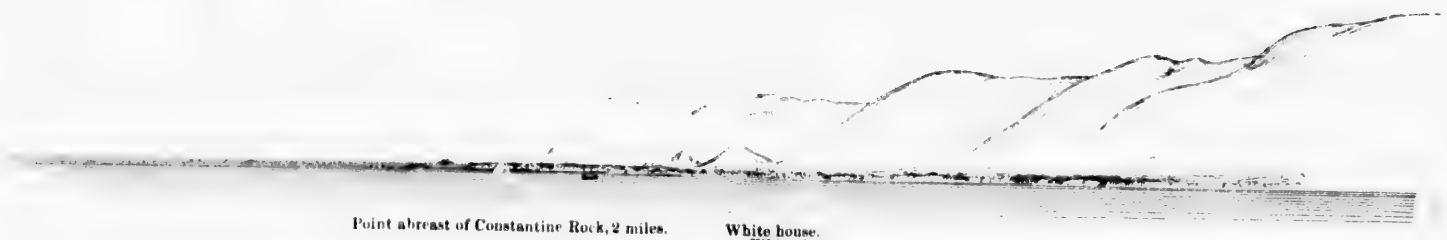
5 feet,
e.

El Morro, 573 feet,
E. by S. ¼ S., 13 miles.

Ridge, 515 feet,
Point Esteros, East 10 miles.

ather.

Point Esteros, 515 feet,
E.SE., 15 miles.



Point abreast of Constantine Rock, 2 miles.

White house.
White fence.

Point Esteros, W. ¼ N., 5 miles, 515 feet.

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The range of treeless hills forming the Point Esteros ridge, parallel with the northwest shore, slopes to the northwest and begins to be wooded about five and a half miles to the northward, with a prominent single tree on the ridge to the south of the wooded part. There is a noticeable sag in the ridge about one and a half miles northwest of Point Esteros, with a slight curve in the shore.

Over this low line of coast hills the high peaks of Rocky Butte and Pine Mountain stand out as well marked landfalls. There are three pine covered peaks to the northwestward of Pine Mountain, but lower.

No hidden dangers are known along this shore line, and the ten fathom curve is less than a mile from the beach. About six and three quarters miles northwestward from Point Esteros there is a rock, about thirty feet high, apparently one-quarter of a mile off shore. Behind this rock the nearest ridge is lower than to the southward, and it is well wooded. There is a low line of reddish cliffs bordering the beach, and many houses are seen on the lower lands. The land is gently sloping and grassy, and the trees begin at about sixty or eighty feet elevation.

Pico Rock is twelve feet above high water, nearly half a mile off shore, and bears south sixty degrees twenty minutes east (S. 60° 20′ E.) from the southwest end of San Simeon Wharf, distant four and one half miles; one-eighth of a mile southeast by east one-half east (SE. by E. ½ E.) from Pico Rock there is a *patch of rocks* showing above high water and awash, with a patch of kelp around it. North-west by west three-eighths west (NW. by W. ⅜ W.) from Pico Rock, and distant from it one-fourth of a mile, are *sunken rocks* that break in heavy weather. Southeast one-half east (SE. ½ E.) one-half mile off shore and distant from Pico Rock three fourths of a mile is a *well defined breaker.*

The Cambria Rock.—Between eight and nine miles from Point Esteros is the *Cambria Rock*, low, small, and sharp; it is ten feet above high water and lies half a mile from shore. From the southwest end of the San Simeon wharf it bears south thirty-five degrees forty minutes west (S. 35° 40′ W.), distant five and one-fourth miles. To the southward and eastward of this rock, distant one-sixteenth of a mile, is a small breaker.

THE VON HELM ROCK, SANTA ROSA CREEK.

This reported danger lies broad off the shore about a mile and a half southeastward of the opening of the Santa Rosa Creek. During the last twenty years one of the coasting captains has seen it break only twice and then in calm weather with a very large westerly swell, so that the rock must be very sharp or have three or four fathoms of water over it. It was seen in January, 1888. The coasting steamers running southward from San Simeon steer a course south fifty degrees east (SE. ½ E.) from the wharf and pass the Cambria Rock half a mile distant on the port hand. This course passes a little more than one mile inside the reported danger, which is estimated to lie one and three-quarters miles off the shore where the trees apparently come down close to the cliff, which is forty feet high. This approximate position of the danger places it two and one third miles south sixty-one and a half degrees east (S. 61½° E.) from Cambria Rock; seven miles south forty and one-half degrees east (S. 40½° E.) from San Simeon wharf and seven and two-thirds miles north seventy-one degrees west (N. 71° W.) from Point Esteros.

Leffingwell's Landing.—Five miles east of San Simeon wharf there is a small cove known as *Leffingwell's Landing*, with a hard sand beach, and a reef of rocks off the western point. At one time there was a wharf at this place, where the small coasting steamers landed during favorable weather. The wharf is not now in existence, having been carried away by the sea. This landing is entirely exposed to the ocean, and can only be used during exceptionally smooth weather in the summer time.

Approaching San Simeon Anchorage.—Between Leffingwell's landing and the anchorage of San Simeon the cliffs are low, with some rocks close under them; and the nearer hills are again destitute of trees. To the northwest of San Simeon Creek, about one and a half miles, is the Arroyo del Padre Juan, and thence half-way to San Simeon landing the Pico Creek. About one and a half miles southeast (SE.) from San Simeon anchorage there is a clump of trees near the shore and about half a mile in extent. They form a mark in approaching from the southward in thick weather.

San Simeon Point, forming the southwestern point of the bay of the same name, lies sixty nine miles north thirty-nine degrees west (N. 39° W.) from Point Arguello and seventy-three miles from

Point Pinos. It is a low, narrow, rocky cliff, only twenty feet high and two hundred and two... yards wide, but gradually increasing in height to the northward until it reaches one hundred and seventy-two feet elevation in half a mile, when the land falls slightly inside. This hillock was formerly covered with bushes but is now all bare and ploughed over. The Point is marked by a cluster of houses three hundred yards from its extremity and on the inner side. One or two of these houses are whitewashed and are conspicuous when approaching the point from the northwestward, but from the southward they do not show so well, and the large warehouse and other buildings near the new wharf, and more particularly a large white barn on the slope of the hill about a mile from the bay, are the most conspicuous landmarks when approaching from that direction. One mile west of the point the bluff is covered by sand dunes extending half a mile along shore and a quarter of a mile inland.

San Simeon Bay, lying to the north and east of San Simeon Point, is quite a small indentation in the coast line and forms a roadstead affording a tolerably good shelter from the northwest winds, but squarely open to the south. In southeast weather it does not give the least protection from the heavy swells, and a vessel must put to sea when they come up. Its extent is two miles in breadth, east and west, and half a mile in depth, north and south. The land behind the bay is comparatively low and gently rolling, only reaching five hundred feet elevation in one and one-third miles. The hills and slopes are covered with grass, except to the westward, where redwood trees cover some of the hill tops, and are found in all the arroyos.

The *prominent landmarks* for this part of the coast are the mountain peaks of *Rocky Butte*, thirty four hundred and forty four feet, and *Pine Mountain*, about thirty eight hundred feet elevation. As seen from seaward, the former is a broad, massive mountain rising above the adjacent range, with a moderately flat top, and marked with pines on the gently sloping crest-line towards the north, but bare and having a sharp fall towards the south. It is in latitude 35° 39′ 49″ north, longitude 121° 03′ 37″ west, and is visible sixty-eight miles from seaward. When Point San Simeon bears east, this mountain shows directly over the sandy side of the hill on the north side of the point. Pine Mountain, six miles northwest (NW.) of Rocky Butte, is a large, round topped mountain with summit and flanks covered with pine forest. It is in latitude 35° 41′ 19″ north, longitude 121° 05′ 45″ west, and is visible seventy-two miles from seaward.

From the southwestern extremity of Point San Simeon the inner or bay bluff shore runs northwest (NW.) for nearly half a mile and thence curves shortly to the north and round to the east. This shore is marked by two short sand beaches. The first is at the mouth of a small arroyo, north half east (N. ½ E.) two-thirds of a mile from Point San Simeon, and the other north three-quarters two degrees east (N. 32° E.) three-quarters of a mile from the point. Two or three rocks lie close under the point, but thence to the northward and eastward the shore is clear of them until past the first sand beach, whence the low bluff shore is bordered by innumerable rocks and patches of kelp. The steamers do not approach it within one or one and a half miles. The old boat landing was at the northwesternmost part of the bay where the shore turns sharply to the northeast, and where the sand beach, exposed at low water, ends.

There were two wharves under the bluff northeast face of the point. The freight wharf, where steamers landed, was three hundred yards inside the extremity of the point, and the whaling wharf, built for the accommodation of the whaling company located on Point San Simeon, one hundred yards. Of these only the latter remain (1883). A fine new wharf has been built from the low bluff about three hundred yards to the westward of the first sand beach, directly seaward and parallel with the face of the northwest bluff. It is three hundred and thirty yards long, with a long, broad end, and reaches a depth of sixteen feet at low water, so that vessels can lie directly at it in smooth weather. Mooring buoys lie off the end and abreast for vessels to moor to in ordinary swell. In heavy southeast weather the steamers do not attempt a landing. There is a railway track from the extremity of the wharf to the fine, large warehouse at the shore end. A store, hotel, and various other buildings have recently been erected to the northward and eastward of this wharf, and they show conspicuously from the southward in clear weather. From the rocks off the extremity of Point San Simeon the outer end of this new wharf bears about north, distant seven hundred yards.

Hydrographic of San Simeon Bay.—Approaching the bay from the southward the depth of water is good, there being three fathoms from three hundred to four hundred and fifty yards off the beach, with kelp generally lining the beach to that depth. Immediately off Point San Simeon

the three-fathom curve extends out not more than two hundred and fifty yards in a thick patch of kelp. Broad off the shore, south of Point San Simeon, the depths are as follows:

13 fathoms, over fine, gray sand and broken shells, at 1 mile.
23 fathoms, over green mud, at 2 miles.
35 fathoms, over green mud, at 3 miles.
50 fathoms, over green mud, at 4 miles.

Along the eastern side of San Simeon Bay the shore is bordered by rocks, as before described, and a large field of kelp lies under this shore between one and six fathoms of water. It is one mile long, from Shag Rock (four hundred and fifty yards east of the wharf) to the southward, and averages nearly three hundred yards in width. The bay itself has quite a uniform bottom, ranging from six fathoms to sixteen feet at the wharf, without any known hidden dangers. But close under and around Point San Simeon, within two hundred and fifty yards, is foul bottom with ledges having twelve, sixteen, and eighteen feet water upon them and straggling kelp around and outside of them.

The reef off the point extends southeastwardly in thick kelp for three hundred and seventy-five yards to six fathoms of water; and two hundred and fifty yards further to the southeast there are three small detached patches of kelp in seven and a half fathoms over hard bottom.

It is said that the best anchorage is about two hundred and fifty yards east of Whaler's or Clark's wharf in three and a quarter fathoms, where there is good lee from the northwest winds. If a vessel be compelled to anchor in the bay in winter this position is probably the best, as the point and reef somewhat break the southwest swell.

Even in summer with the usual northwest winds a southwesterly swell rolls in.

SAILING DIRECTIONS.

Vessels coming from the northwestward may run boldly round Point San Simeon, within a few hundred yards of the shore outside the line of kelp in eight or nine fathoms, round up to south, and anchor anywhere off the sand beach in five fathoms, hard bottom, and a little over a quarter of a mile from shore. In thick or foggy weather vessels working up from the southward must make short tacks close in shore or they will assuredly miss it. They can work close under the land to the edge of the kelp, which generally lines the shore to the three-fathom line. The clump of trees, already mentioned, about one and a half miles southeast of the anchorage, is a good landmark; and, coming from the northwestward, the Piedras Blancas are sure marks for making the anchorage.

The secondary astronomical station of the Coast and Geodetic Survey was on the rise just off the beach near the shore end of the present new wharf, and bearing north five degrees west (N. 5° W.) from the extremity of the point, but the locality has been so thoroughly changed that the geographical position of the summit of the hill over the point is given instead, as follows:

Latitude	35°	38′	22″ north.
Longitude	121°	11′	49″.4 west.
Or, in time	8h	04m	47s.3.

The computed magnetic variation from January, 1885, was 15° 36′ east, with a yearly increase of 4′.1.

Tides.—The times and heights of the tides are very irregular, but may be taken from the printed tide tables of the Coast and Geodetic Survey as ten or fifteen minutes later than those of San Luis Obispo. The Corrected Establishment, or mean interval between the time of the moon's transit and time of high water is 1Xh, 48m. The mean rise and fall of the tides is four feet; of spring tides five and six-tenths feet; and of neap tides two and three-tenths feet. The mean duration of the flood is 6h, 11m; of the ebb 6h, 14m. The rise of the highest tide observed in June and July, 1884, was seven feet above the plane of reference, and the lowest was two and two-tenths feet below, thus giving an extreme range of nine and two tenths feet.

It was in this bay that the large steam-ship *Pioneer* put in leaking badly in 1852, and after being driven ashore and abandoned was got off and carried to San Francisco.

A hydrographic sketch of it was first published by the Coast Survey in 1852. Surveys were made in 1872, and a hydrographic examination was completed in 1884.

Westward from Point San Simeon the shore is low bluff, bordered with rocks, and forms the edge of a gently sloping plateau stretching from the foothills.

About one and two-thirds miles westward from the Point there is a break in the bluff at the mouth of a small stream opening abreast of Castro's house and known as Castro Creek. The beach here is quite broad at low water, but produce was occasionally shipped from here before the building of the wharves in San Simeon Bay.

When Point San Simeon bears east, three and a half miles distant, the large Castro house on the bluff is directly under the high, timbered summit of Pine Mountain; and Rocky Butte shows just to the left of Point San Simeon. These mountains have already been described (see page 122).

THE PIEDRAS BLANCAS.*

These well-known rocks and landmarks lie four and three-quarters miles north, eighty-four degrees west (N. 84° W.) from Point San Simeon.

They are two large, white, sharp-topped rocks close to the low, rocky shore of Point Piedras Blancas, and nothing else like them is found on this part of the coast. The eastern one is a double rock, eighty-two feet high, one hundred and seventy yards long northwest and southeast, and lies six hundred and twenty yards from the shore five-sixths of a mile east by south (E. by S.) from Piedras Blancas Light house. It lies, therefore, under the eastern shore. It has from four and a half to six fathoms of water around its north, east, and south sides; with foul bottom stretching one hundred and twenty yards southwest by west (SW. by W.) from its north point. In this foul ground the depth is nineteen feet, and possibly less. No kelp is laid down around it, and none outside or inside of it. Between it and the shore the depth is seven to three fathoms; and just on the edge of the three-fathom line, and two hundred and fifty yards from the rock, lies a sunken rock, bare at extreme low waters. The western one of the Piedras Blancas, one hundred and thirty feet high and one hundred and fifty yards in extent, lies close under the southwestern extremity of Point Piedras Blancas. The space between the point and the rock is only one hundred and fifty yards wide and is barred by a broad, shelving, rocky bottom, bare at low water. There is deep water (nine fathoms) close under the outer face of this rock. When it bears north-northwest distant two miles it has a very striking resemblance to a *lion couchant*, and is frequently called the "Lion Rock." When bearing northwest (NW.) it is separated nearly its width from the Point, and the eastern rock is seen projected on the eastern limit of the sand dunes. When the light-house bears west-northwest (WNW.) it appears almost midway between the two rocks.

Before the location of the light house at this point, these rocks were the marks for making the harbor of San Simeon from the northward; and steamers bound north from outside the Santa Barbara Islands generally haul in under the land before they are up with them.

Point Piedras Blancas, immediately inside these rocks, is a small, low, rocky point, eighty feet, at its highest part, above the sea; with a low, narrow neck behind it, whence sand dunes stretch northeastward and spread out for half a mile.

The country behind the point is comparatively low, only rising to five hundred feet in two miles; but it then rises rapidly to the high mountains forming an amphitheater from east to northwest of San Simeon Bay and the coast thence to Piedras Blancas. These mountains are very bold, and from seaward appear quite close upon the sea-board. Of these the two most prominent peaks are Rocky Butte, which rises to an elevation of thirty-four hundred feet at six miles from the coast-line, nine and a half miles north sixty degrees east (N. 60° E.) from Piedras Blancas Light house, and Pine Mountain, which attains an elevation of thirty-five hundred feet at six miles from the coast-line, and lies seven and a half miles north sixty-eight degrees east (N. 68° E.) from the same point. The detailed description of these mountains, with their geographical positions, has already been given on page 122.

For description of anchorages and dangers in the approaches to Piedras Blancas, see pages 127 to 128.

LIGHT-HOUSE AT POINT PIEDRAS BLANCAS.

This is a sea-coast light of the first order, lighting the entire horizon, and is situated on the highest part of the hillock forming Point Piedras Blancas. The building is a brick tower, in the form of a cone; it is ninety feet in height, painted white, with the lantern gallery and balustrade black and the dome red. It is situated fifty feet in front of the keeper's dwelling, which is a two-story

*Spanish for white rocks.

Point Piedras Blancas
Light-house, NW., 14 miles.

Pine Mountain,
height 3,660 feet.

Rocky Butte,
North, 13¼ miles; height, 3,460 feet.

High land hidden by thick haze.

Sand dunes.

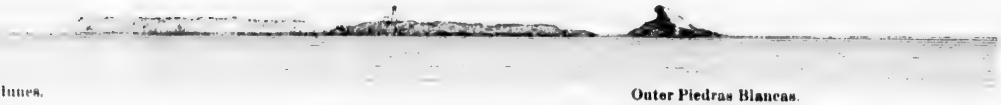
Pine Top.

La Cruz Top.

Piedras Blancas Light-house, NE. by E. ½ E., 4 m

Piedras Blancas Light-house, SE. by E. ½ E., 2¼ miles

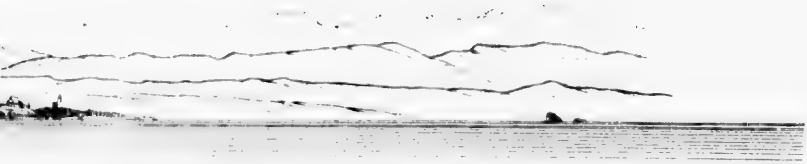
Outer Piedras Bl



dunes.

Outer Piedras Blancas.

Piedras Blancas Light-house, E.SE., 4 miles.



La Cruz Top.

Light-house, NE. by E. ¼ E., 4 miles.

Burnett Peak. Pine Mountain.

Outer Piedras Blancas, from photograph.

Light-house,
24 miles

Outer Piedras Blancas.

The outer Piedras Blancas.

Piedras Blancas Light-house, NE. ¾ E., ¾ mile.
Hills in cloud and haze.

Inner Piedras Blancas,
N.NE. Hills in cloud and haze.

Cape San Martin. Outer Piedras Blancas.

Piedras Blancas Light-house,
NW. by N., 5 miles

Inner Piedras Blancas.

Outer Piedras Blancas. Inner Piedras Blancas.

Point Piedras Light-house,
NW. by W. ½ W., 8 miles.

Point San Simeon.

White barn.
San Simeon Landing, NW., 5 miles.

wooden structure painted light buff with out-houses and fences whitewashed. It was erected in 18[illegible].

The illuminating apparatus is of the first order of the system of Fresnel, and shows from sunset to sunrise a *fixed white light varied by a flash every fifteen seconds.* The focal plane is one hundred and seventy feet above the mean level of the ocean, and in clear weather it should be seen from a distance of—

10 feet at a distance of 18.6 miles.
20 feet at a distance of 20.1 miles.
30 feet at a distance of 21.2 miles.
60 feet at a distance of 23.8 miles.

The arc of visibility from seaward is two hundred and eighteen degrees of the horizon, from one hundred eighty seven and a half degrees east (S. 87½° E.), Point San Simeon five miles distant, round by the south and west to north forty four and a half degrees west (N. 44½° W.), a point four miles distant. Owing to the closeness of this light to the western Piedra Blanca, a shadow, one hundred and fifty yards long and fifteen yards wide, is cast by the rock to the southwest.

The geographical position of the Light-house, as determined by the Coast and Geodetic Survey is:

Latitude	35	39	50.1	north.
Longitude	121	17	06.3	west.
Or, in time	8h	05m	08s.42	

The computed magnetic variation for January, 1885, was 15° 44′ east, with a yearly increase of 1′.1.

From the Light house, the bearings and distances to prominent points are given as follows:

Point Esteros	SE. by E. ½ E., distant 18 miles.
Point San Luis	SE. ½ E., distant 38 miles.
Point Arguello	SE. ½ S., distant 72 miles.
Cape San Martin	NW. ½ W., distant 18 miles.
Point Sur	N.W. ½ W., distant 50 miles.
Point Pinos (not intervisible)	distant 67 miles.

The coasting steamers making San Simeon Bay from the northward in foggy weather need a long whistle at Point Piedras Blancas, because before being up with it they have a long run from the northward without any aid to navigation. Vessels from the southward have likewise a long run without any aid to navigation.

Immediately to the northward of Point Piedras Blancas the shore line continues of low, sandy bluffs with rocky projections and many rocks close under the shores.

Point Sierra Nevada is a low, bluff point, covered with sand dunes, and lies northwest one-quarter north (NW. ¼ N.) three and one-eighth miles from Point Piedras Blancas; it was named for the steam-ship *Sierra Nevada*, which was wrecked on the rock stretching four hundred yards northwest (NW.) from the point. Part of the wreck is still visible at low water (1884). This reef is a serious menace to vessels that hug the coast in foggy weather, especially as the set of the inshore current at this point is towards the north-northeast (NNE.).

Under the south side of the point empties the Santa Cruz Creek, with a broad sand beach east and south, off which lies the *La Cruz Rock*, forty eight feet high, and forming the extremity of an exposed reef stretching southeast from the shore. Its southwest extremity is four hundred and [illegible] yards off shore and lies two and five-sixths miles north forty-five degrees west (N. 45° W.) from Point Piedras Blancas Light. In December, 1884, this rock showed a long black base, and a rather sharp pointed top, when seen from the southwestward.

There is a broad sand beach for one-third of a mile northward from the western extremity of Point Sierra Nevada, and one and a half miles northward of this point the San Carpoforo Creek empties into the ocean. This creek and the Santa Cruz are both considerable streams, and their valleys are cut down deep between the hills. The latter runs seven miles eastward between the mountains and then turns abruptly to the northwest for as many more miles; this part is known as the Burnett Cañon.

Over this comparatively low-lying sea-board the strong northwest winds, which have been driven to seaward by the Santa Lucia Mountains, sweep with great violence, and constitute this one of the "wind-gaps" of the coast.

Hydrography off Point Piedras Blancas and its approaches, from Point San Simeon to Point Sierra Nevada.—The present northern limit of the detailed topographical survey of the coast-line in this section of the coast is at one mile northward of the San Carpoforo Creek, and the hydrography has now (1884) been completed as far north as Point Sierra Nevada.

Northward of Point San Simeon the three fathom line follows the shore within about five hundred yards, in some places being a little outside and at others nearer the shore. At Piedras Blancas it is close under the point, sweeping inside the eastern white rock and close under the shore to Lion Rock. Northward of Piedras Blancas and beyond Point Sierra Nevada it follows the shore closely, except abreast the Harlech Castle Rock, where it is eight hundred yards from the beach, and three hundred and fifty yards inside the rock.

The *kelp* borders the shore irregularly. It is in detached patches around Point San Simeon out to five and six fathoms three hundred and seventy five yards southeastward of the point. A mile northwest of the point there is a field over half a mile in extent in the receding shore under Castro's House, with irregular and straggling patches around sunken rocks or over rocky bottom. Small patches of kelp are found in as much as thirteen fathoms without known dangers. There is a very small but compact field just under the south-southeast (SSE.) point of Piedras Blancas and lying between three fathoms and nine and ten fathoms, but having foul ground with three and three-quarters fathoms near, and inside, its southernmost limit.

Within half a mile north of Piedras Blancas a compact field begins and runs nearly three miles to La Cruz Rock. Its outer edge ranges from one quarter to three-quarters of a mile off shore, and from five to ten fathoms water. In the survey of 1884 the outer edge retreats one hundred yards inside Harlech Castle Rock, but there is kelp around the rock, and detached masses for over three hundred yards outside to ten fathoms.

Around La Cruz Rock the kelp reaches to seven and eight fathoms, with detached patches in eleven fathoms.

Off Point Sierra Nevada detached kelp reaches to seven fathoms, and even to eleven and a half fathoms. Inside the kelp the point is surrounded by breakers from three hundred to six hundred yards off shore.

The general depths of water off this stretch of the coast are as follows:

Abreast of Point San Simeon there is a depth of:

13 fathoms at one mile, bottom coarse gravel, broken shells.
23 fathoms at two miles, bottom broken shells.
43 fathoms at three miles, bottom green mud.

Off Piedras Blancas there is a depth of ten fathoms eighty yards outside Lion Rock, with fine gray sand and broken shells.

16 fathoms at one-half mile, bottom fine gray sand.
23 fathoms at one mile, bottom gray sand.
46 fathoms at two miles, bottom green mud.

At a position five and a half miles southwest (SW.) from Point Piedras Blancas, a Coast Survey vessel in 1876 obtained a sounding of two hundred and fifty-two fathoms of water; bottom slimy mud.

Off Point Sierra Nevada there is:

13 fathoms at one-half mile, bottom rocky, broken shells.
16 fathoms at one mile, bottom rocky.
25 fathoms at two miles, bottom rocky.
35 fathoms at three miles, bottom rocky.

Northwestward of Point Sierra Nevada the deeper water approaches the shore closer in advance northward. On a line southwest of the Arroyo San Carpoforo there is a depth of:

11 fathoms at one half mile from the beach, bottom gray sand.
17 fathoms at one mile from the beach.
27 fathoms at two miles from the beach.
35 fathoms at three miles from the beach.
42 fathoms at four miles from the beach.

It is unsafe to go inside the kelp, and on account of several sunken rocks it is dangerous to approach nearer than half a mile to the shore except in rounding under Point San Simeon or Piedras Blancas. It is not safe to anchor in the bight under Castro's House.

Dangers.—The survey of 1884 has developed some hidden dangers between San Simeon and the Arroyo San Carpoforo, which are here described as follows:

From three-quarters to one mile from Point San Simeon, going northwestward, and six hundred and fifty yards off shore, there is *very foul bottom* with fourteen to eighteen feet of water. Irregular bottom stretches out to the ten-fathom line at three-fifths of a mile from shore.

Five and a half miles southwest of the Piedras Blancas Light, the bottom is slimy mud and the depth two hundred and fifty-two fathoms.

There is a *fourteen-feet rock* three-fifths of a mile off the shore towards Castro's House, when it bears north nineteen degrees east (N. 19° E.). It has six fathoms outside it, but the ground inside is broken to the three fathom curve close to it.

There is a *three-and a-quarter-fathoms spot*, with broken bottom half a mile broad off the shore, when Castro's House bears north forty-three degrees east (N. 43° E.). It has straggling kelp upon it and deep water around it; nine fathoms outside and seven fathoms inside. The three-fathom curve lies nearly half-way in towards the shore. Straggling kelp lies to the west northwest (WNW.) of it. This is the outermost hidden danger between San Simeon and Piedras Blancas.

There is broken bottom and *nineteen feet of water* one hundred and fifty yards west of the two rocks one mile east-southeast (ESE.) of Point Piedras Blancas, but the water to the south and east ranges from four and a half to six fathoms.

Off the western side of Point Piedras Blancas there are *two sunken rocks*, four hundred and forty yards from shore, with fourteen feet of water and less upon them, and six and seven fathoms of water outside them.

A *whistling buoy* with *black and white perpendicular stripes* has been moored off Point Piedras Blancas.

It lies in fourteen fathoms of water over hard, sandy bottom, three-eighths of a mile southwest by west three-quarters west (SW. by W. ¾ W.) from the Great Lion Rock. It is in range with the light house tower just open to the northward of the highest part of the rock.

The buoy is sounded by the action of the sea, and gives from twenty to thirty blasts in each minute. It was placed August, 1888.

Harlech Castle Rock.—This danger lies in the three-mile bight north forty-two degrees west (N. 42° W.), nearly one and a half miles from Lion Rock (Piedras Blancas), and a little over half a mile from shore. The rock is one foot above low water, and the mass of kelp in this bight, and the deep water around it, there being not less than six and a quarter fathoms outside an area of eighty by forty yards which embraces the rock. This area has twelve to sixteen feet of water over it. It generally breaks on the rock, which rises steeply on the west side, and is nearly vertical on the eastern face. There is foul bottom in the kelp-field four hundred yards northeast (NE.) and five hundred yards north of the Harlech Castle Rock, with eighteen feet of water, and perhaps less.

The British ship *Harlech Castle* was run upon this rock in August, 1869, in broad daylight and clear weather, and made false reports of the circumstances of the wreck and the position of the danger. When the Coast Survey party examined the locality the vessel's masts were yet standing.

Several *sunken rocks* with fourteen feet of water on them lie on the outer edge of the extreme southwest (SW.) point of the Harlech Castle Rock kelp field. The outer one bears north fifty-one degrees west (N. 51° W.), distant two and one-sixth miles from Piedras Blancas Light; and south forty-three degrees east (S. 33° E.), one and one-sixth miles from Point Sierra Nevada. Inside these sunken ground the bottom is very irregular, and thirteen feet is found outside the three-fathom curve.

Northwestward of Point Sierra Nevada the shore-line is rocky with broad, rocky beaches exposed at low water. At one and a half miles north thirty-three degrees west (N. 33° W.) from Point Sierra Nevada, and seven hundred yards off the shore, there are *breakers and sunken rocks* over an area of nearly one hundred and fifty yards square, with deep water around, and ten fathoms seventy yards to the west. And at two miles north twenty-seven degrees west (N. 27° W.) from Point Sierra Nevada, and six hundred yards from shore, there is another patch of *breakers and sunken rocks* over an area of one hundred and fifty yards. There is deep water all around it.

Between one mile beyond the Arroyo San Carpoforo there is no known danger outside the three-fathom line.

Off Ragged Point, which is half a mile south of the San Carpóforo, the visible rocks stretch out four hundred yards to the west; but there is deep water beyond.

Anchorages.—On the earlier editions of the general coast-chart from San Diego to San Francisco there is an anchorage laid down in the small bight to the northwestward of Point San Simeon, but the recent hydrographic survey has proved the locality to be dangerous.

Piedras Blancas Anchorage.—The surveying steamer found good anchorage under the southeast side of Point Piedras Blancas in four to five fathoms of water over fine, gray sand, with the Light-house bearing west half south (W. ½ S.). The Light-house tender also anchors here and the supplies are landed on the little beach east of the low neck that connects the point with the mainland, where there is a fair boat-landing in smooth weather.

La Cruz Rock Anchorage.—The surveying steamer found protection and moderately good anchorage under the southeast side of La Cruz Rock, half a mile southeast (SE.) of Point Sierra Nevada. It is not a very comfortable anchorage, but is safe in ordinary northwest weather. Anchor in four fathoms with outer point of the rock bearing west by south (W. by S.) and Point Sierra Nevada open by the inner end. There is a break in the kelp southward of the rock affording a clear passage through to the anchorage. (For description of La Cruz Rock see page 77.

Northward of La Cruz Rock the kelp is thick and the breakers extend thence along the shore to Point Sierra Nevada and around it.

Currents off the coast near Piedras Blancas.—During the execution of the hydrography northwestward of San Simeon in the summer months, a close inshore current was found setting to the northeastward (NE.) along the coast-line. The breadth of this stream was about one mile; outside of it the current was setting to the southeastward (SE.)

As vessels generally keep within a mile of the shore, this eddy current must be taken into consideration, especially when seeking for an anchorage in thick fog.

COAST-LINE NORTH OF PIEDRAS BLANCAS.

The Landfall.—The mountains, which had fallen back behind Los Esteros, gradually approach the coast north of San Simeon; and about six to eight miles northwestward of the Piedras Blancas the rolling lands terminate abruptly at the base of the southern angle of the *Sierra Santa Lucia*,* which runs to Point Carmel and forms the boldest and most compact shore on the California or Oregon coasts. The range attains a nearly uniform elevation of four thousand feet, with peaks towards the northern end of five and even six thousand feet. From their abrupt faces we have seen cascades falling from heights of forty or fifty feet directly into the sea.

The two highest peaks of the range are *Cone Mountain* (elsewhere referred to as Twin Peaks) and *Mount Santa Lucia*, lying north of Cape San Martin. The former is a conical, tree-clad peak, about five thousand two hundred feet in elevation, and lies in latitude 36° 03′, longitude 121° 29′, and three miles from the coast line. The latter is about six thousand feet in elevation, lies in latitude 36° 08½′, longitude 121° 25′, and about nine or ten miles from the coast. The latitudes and longitudes of both are approximate. A deep valley, parallel with the coast range, lies between these two great mountains. Mount Santa Lucia has great pine trees on and about its double head, but they may not be readily made out from seaward; nor can this double head be made out from seaward, the depression between them being very slight and short. In clear weather the mountain should be seen at a distance of eighty-five miles; but it is not seen by the coasting steamers, as they usually keep about three miles from the coast line.

COAST-LINE NORTHWESTWARD OF SAN CARPÓFORO.

The Carpoforo is a deep cañon-like stream-bed at the northern limit of the high, rolling lands northward of Piedras Blancas, and the commencement of the great barrier of the Sierra Santa Lucia. One and a half miles in from the mouth of the creek, Bald Top Mountain reaches two thousand four hundred and fifty feet elevation, and then the crest-line runs northwesterly nearly parallel with the shore.

After passing the Carpoforo the cliffs become very wild, black, and jagged, and rise from two hundred to even five hundred feet above the sea; they are very precipitous and do not spread out

*Named Las Sierras Nevadas in 1542 by Cabrillo, who placed them in latitude thirty-seven and a half. In December, 1602, Vizcaino approached them from the Sierra Santa Lucia, and says they are the usual landfall from China.

On his chart he has the legend for this part of the coast: Costa de sierras dobladas de mucha arbolera.

"In 1769 Father Junipero Serra's party came upon this barrier, and Don Miguel Constanzo, the engineer, determined the latitude of the southern foot of the Sierra Santa Lucia 35° 45′"; a good approximation.

Pine Mountain.
Rocky Butte.
Piedras Blancas Light-house, E.SE., 7 miles.

Tree

at the water-line, where there is no beach and but few small rocks visible close in shore. Outside of the shore there is a narrow line of kelp that reaches from three hundred to five hundred yards from the base of the cliffs.

The first crest-line is less than two miles from the shore, and averages nearly twenty-five hundred feet elevation. It is narrow and sharp, very rough and rocky, and marked in a few places by scattering pine trees. Deep and rocky arroyos are cut from the ridge to the sea, and many of them are absolutely impassable. The main trail is consequently forced to keep along the crest-line. Here and there on the top of the cliffs are small areas of moderate slope, and settlers' houses are seen in every available spot. The steamer captains learn to know the peculiarities of these houses as they skirt the shore in thick or very stormy weather.

Salmon Creek opens through a deep gorge at three miles from the Carpóforo. It is the deepest cañon thus far, and is notable as breaking down the crest-line from twenty-five hundred feet to less than one thousand. On the east side of this depression is Mount Mars, and on the west side is Silver Peak. At the west side of the mouth of the cañon is the rocky butte called Salmon Cone; through the depression of the crest-line is seen Lion Peak. A large body of water tears down the cañon with torrential force, and at several hundred feet above the sea the descent is so sharp that the broken water presents from seaward the appearance of a high, narrow waterfall.

Salmon Peak.—This landmark is well known to the navigators. It is a bold, rocky butte, only two hundred yards from the shore, and is situated on the west side of the mouth of Salmon Creek. It rises to four hundred and forty one feet elevation with a low neck immediately behind it. It is, however, projected bodily against the higher mountain mass behind it. On the west side of the butte there was an old Chinese fishing camp and landing. The butte is nine and a half miles north forty-two degrees west (N. 42° W.) from the Light-house at Piedras Blancas.

White Rock No. 1.—Nearly half a mile outside the slight projection just west of Salmon Creek this rock lies out in comparatively deep water. It is thirty-nine feet high and has a slight patch of kelp on the shore side. One hundred and ninety yards to the westward of this rock there is a rock awash at lowest tides. There is no kelp around it. The kelp along the cliff shore extends about half-way out to White Rock. This rock lies nine and a half miles north forty-four and a quarter degrees west (N. 44¼° W.) from the Light-house on Piedras Blancas.

White Rock No. 2.—This rock lies close under the cliffs, which are here two hundred and fifty feet high. It is two and one-eighth miles northwestwardly from Salmon Creek, and eleven and a half miles north forty-four and a half degrees west (N. 44½° W.) from Piedras Blancas Light-house. It is well inside the line of kelp which here extends out about one-third of a mile. No height is given for this rock.

It is dangerous to go inside the kelp along this shore. Between White Rock No. 1 and White Rock No. 2 there are hidden dangers in the outer edge of the kelp, and also one rock awash at the lowest tides.

Mars Mountain.—This is one of the peaks in the crest-line north of the Carpóforo. It is a bare topped butte about three quarters of a mile eastward of the Salmon Creek depression and one mile from the shore. It is twenty-five hundred and eighty eight feet high. From the Light-house at Piedras Blancas it bears north thirty-three and a half degrees west (N. 33¼° W.), distant nine and a half miles.

The geographical position of this landmark is:

Latitude	35° 48′ 38″ north.
Longitude	121° 20′ 30″ west.

Silver Peak.—This is another peak of the outer crest-line of Sierra Santa Lucia. It is chaparral covered, and lies two miles to the westward of the Salmon Creek depression and two miles inland from the coast-line abreast of White Rock No. 2. It rises to a height of thirty-four hundred and seventy six feet, and deep gorges run from its summit down to Salmon Creek, to the ocean and to the northward.

It lies eleven and a half miles north thirty-four and a quarter degrees west (N. 34¼° W.) from the Light-house at Piedras Blancas.

The geographical position, as given by the U. S. Coast and Geodetic Survey, is:

Latitude	35° 50′ 46″ north.
Longitude	121° 21′ 35″ west.

Lion Peak.—This is a well-known landfall in the second inner crest-line of the Sierra Santa Lucia, and is more particularly noticeable when seen through the depression of the Salmon Creek

on a north-northeast bearing. It lies three and one-third miles from the mouth of Salmon Creek, and rises to an elevation of thirty-six hundred and eighty feet.

The geographical position of the peak, as determined by the Coast and Geodetic Survey, is:

Latitude	35	50	59	north.
Longitude	121	19	20	west.

The Twin Peaks.—This is the name given to Cone Mountain by the navigators on this coast. As seen from certain directions it presents but one peak, and from Mount Santa Lucia there is no appearance of a second peak. But from the shore to the northwest and southeast and from seaward a second peak is clearly made out, and the Twin Peaks have become a noted landmark that is frequently visible when the lower mountains and shore are hidden by thick haze or smoke, or moderately low shore fogs.

They lie almost exactly half-way between the Piedras Blancas and the Sur, and only three miles from the sea. The outer peak is slightly the lower, and is half a mile west of the principal cone. Vessels approaching them from the southeastward on the usual course, passing a mile outside of the Piedras Blancas and two or three miles off Cape San Martin, first make them out over the shoulder of Cape San Martin when four or five miles northwest of the Piedras Blancas, bearing nearly north thirty-nine degrees west (N. 39° W.) distant twenty-one and a half miles. The two peaks are then estimated to be about two degrees apart, and the eastern one is apparently the higher and slightly the more peaked. The depression between them is about one degree. When they are bearing northeast three-quarters east (NE. ¾ E.) (or abeam on the usual course up or down the coast) they are still well separated, but the western peak has its distinctive front by a lower rounded peak coming in front of it. In this position a vessel sees Lopez Point, a small table-land about eighty feet high, on the coast-line under the Twin Peaks. When running to the northwestward of the Twin Peaks they appear as one when they bear about east by north one-third north (E. by N. ⅓ N.) with a shoulder of the range curving from Cone Peak to Lopez Point almost hiding them. From the summits of the peaks nearly to the shore, the face of the range is cut by great chasms and presents a wild and terribly broken aspect. As the steamers on schedule time always pass the Twin peaks in the night it has been difficult to observe details.

Twin Peak Cove.—This is the name of the cove immediately under the southwest flank of the Twin Peaks Mountain.

Pluskett Rock is eighty-four feet above high water; it is at the southeast point of the Pacific Valley Landing in Twin Peak Cove.

Pico Blanco or the *Sur Peak*, for description of which see Landmarks at Point Sur, pages 135, 136.

Mount Carmel, lying north thirty-three degrees east (N. 33° E.) seven and a quarter miles from Point Sur, rises to an elevation of four thousand four hundred and fourteen feet above the sea, and is visible seventy-five miles from seaward. It lies in latitude 36° 23′ 01″ north, longitude 121° 47′ 18″ west. In the Coast Survey triangulation it was called Boulder Mountain because the rounding, treeless summit is covered with great boulders.

Description of the shore line.—A detailed description of the shore-line immediately to the northward of Point Piedras Blancas, as far as Arroyo San Carpotoro, has already been given. The stretch from San Carpotoro to Cooper's Point, just south of Point Sur, has been reconnoitered, and therefore a reasonably close description can be given.

From Point Piedras Blancas the coast trends northwest three-quarters west (NW. ¾ W.) fifty-seven miles in an almost straight line, this course passing three miles outside Cape San Martin at sixteen miles. From Point Piedras Blancas to Point Sur the course is north fifty-four degrees west (N. 54° W.), and the distance forty-eight and three-quarters miles.

Salmon Head.—Following the coast nine and a half miles from Piedras Blancas is the mouth of Salmon Creek Cañon, which is very deep and crooked, and opens upon the coast close into the south side of Salmon Head. The latter is a precipitous head forming a slightly projecting point rising fifteen hundred feet above the sea in one-quarter of a mile, with still higher, rough mountains close behind it. This head lies north thirty five degrees west (N. 35° W.) six and a quarter miles from Point Sierra Nevada.

One mile to the north-northwest from it, Soda Mountain rises to twenty-five hundred and feet, only one-half a mile from the shore; Silver Peak, two and one third miles to the north, rises three thousand three hundred and seventy-five feet, only one and one third miles from the shore.

Two white rocks lie half a mile off the shore abreast Salmon Head. They are each about feet high. The southern one lies almost three quarters of a mile south of the head, and five and

The

The Twins, 5,100 feet, E.NE., 11 miles.

The Twins, in line, 5,100 feet, E. ½ N., 14 miles

The Twins, opening, E. ½ S., 18 miles.

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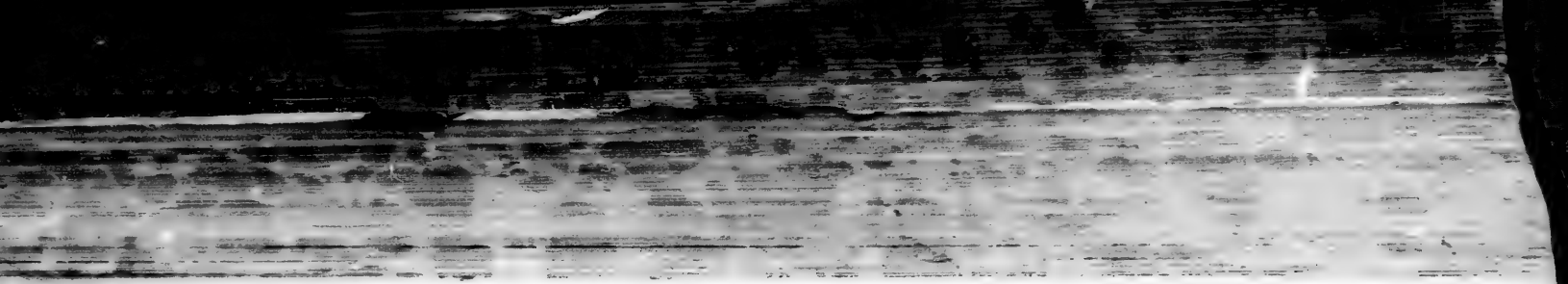
The Twins Cove.
The Twins, 5,100 feet.
NE ¼ N., 6 miles: rock 3 miles.

The Twins, 5,100 feet, NNE., 10 miles.



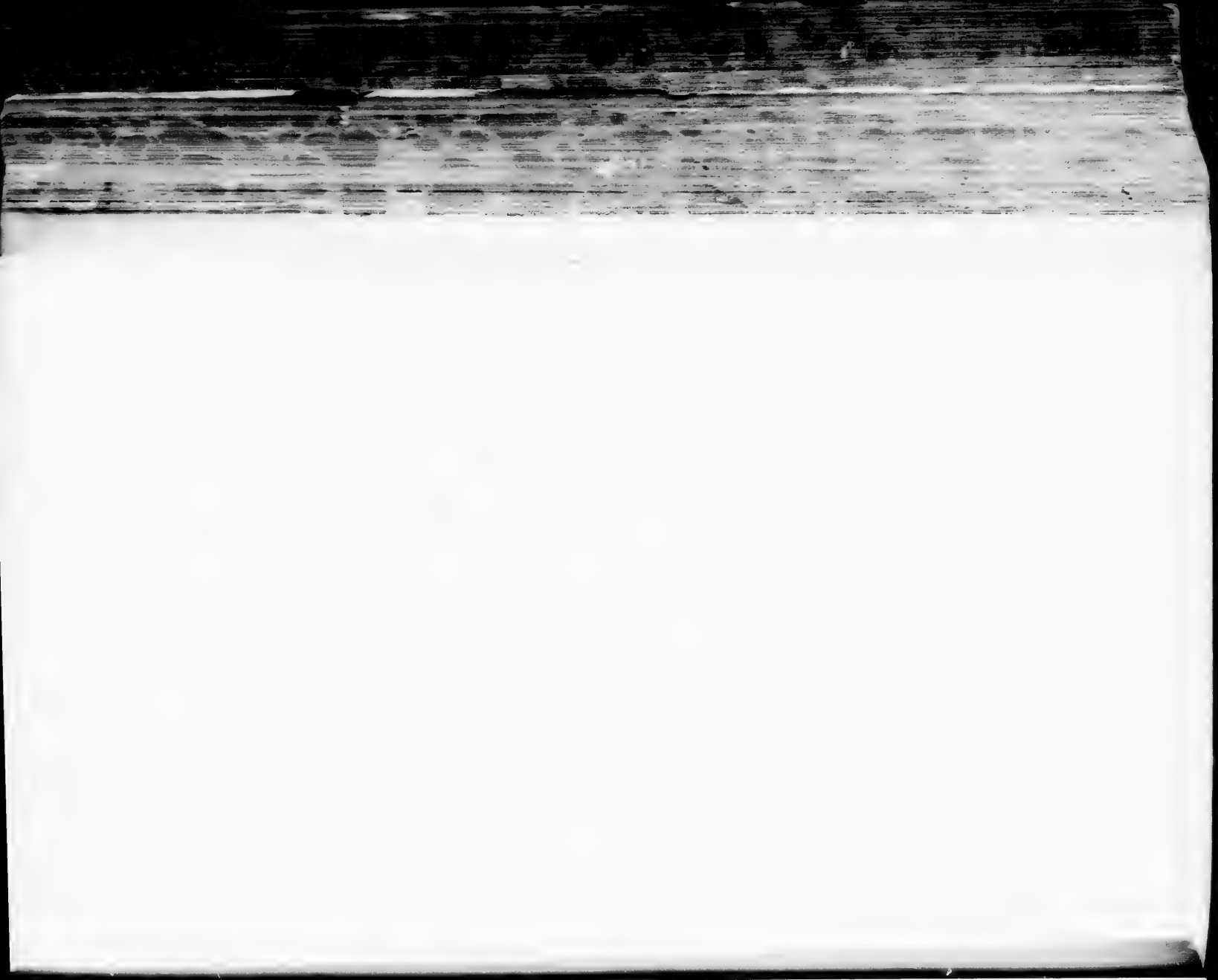
Piedras Blancas Light-house, E. by S., 7 miles.

La Cruz Rock, north of Piedras Blancas.
1 mile off mouth of Arroyo Santa Cruz. NE. ¾ N., 1½ miles.

Point Piedras Blancas,
NW. by W. ¼ W

Cape San Martin,
NW. ¼ N., 34 miles

Point Esteros Ridge;
Point Esteros, E. by S., 3 miles.



San Martin Rock, 134 feet.
Cape San Martin, NW. ¼ N., 21 miles.

Rock, 134 feet.
Cape San Martin, N. 31° W., 17 miles.

The Twins, 5,100 feet, 25 miles.

Pico Blanco (has just disappeared)
3,660 feet, NW., 39 miles.

The Twins and Cape San Martin,
N. by W. ½ W., 19 miles.

Plaskett Rock, 84 feet. San Martin Rock, 134 feet
Cape San Martin, N.NW., 10 miles.
The Twins, 5,100 feet, N.NW., 18 miles.

he Twins and Cape San Martin,
N. by W. ¼ W., 19 miles.

Pico Blanco (has just disap[illegible], 84 feet. San Martin Rock, 134 feet
3,660 feet, NW., 39 miles [illegible]pe San Martin, N.NW., 10 miles.
[illegible]t, N.NW., 18 miles.

Lopez Rock, distant 1 mile.
The Twins, 5,100 feet, 6½ miles.

San Martin Rock, 134 feet.
Cape San Martin, SE. by E. ½ E., 14 miles

The Twins, 5,100 feet, NE. by N. ½ N., 9 miles.

The Twins, 5,100 feet, N. ½ E., 13 miles.

a half miles north thirty-nine degrees west (N. 39° W.) from Point Sierra Nevada. There are smaller rocks stretching out from it towards the northwest for half a mile; the outer one of these is about twelve feet above water, and has a knob on the top, suggesting the idea of a gigantic bird. The second, or northern, white rock lies a little over one mile to the northwest of the former and about half a mile off shore. It is estimated to be about fifty feet high, but not quite so large as the southern rock. It lies off the face of the terrifically precipitous mountains from Salmon Head northwestward. From Point Sierra Nevada it bears north forty-one degrees west (N. 41° W.) distant six and two thirds miles.

Between Salmon Head and the southern part of Cape San Martin there are three short mountain streams that enter through deep cañons—the Buckeye Cañon, Villa Creek, and Alder Creek. Close under the shore on the south side of Alder Creek Cañon there is a white rock about fifty feet high. There is a ranch house on the north side of the cañon. The stream heads up under Alder Creek Mountain, which rises to three thousand five hundred feet at two and one-third miles in a straight line from the mouth of the cañon. The cañon is full of large redwood trees.

One mile to the northwest of this cañon is the southern part of Cape San Martin, twenty-seven hundred and six feet above the sea.

CAPE SAN MARTIN.

Fourteen miles northwest from the Piedras Blancas the southern part of the bold headland of Cape San Martin* makes out as a wild, precipitous spur of the mountains. It presents a front of three miles in extent, and the middle part is sixteen miles north forty-four degrees west (N. 44° W.) from the Piedras Blancas, and thirty-three and one-quarter miles south sixty degrees east (S. 60° E.) from the Sur. At its southern angle this headland rises to twenty-seven hundred and six feet elevation at less than half a mile from the shore. It is a massive, broad shoulder of the coast range crowding down upon the ocean.

From the shore, the rugged and almost inaccessible mountains stretch northward from the southern point of the head, rising to thirty-one hundred feet in one and two-thirds miles from the shore. There is said to be an anchorage under the south side of the cape, but it is only a lee for small craft against heavy northwest winds.

The north point of the cape forms the southern limit of the Pacific Valley Cove.

The geographical position of the middle of the Cape is:

Latitude	31	53′	45″	north,
Longitude	121	26	10″	west,

and from the Cape we have the following bearings and distances to important points:

Piedras Blancas Light-house	S. 44° E. distant 16 miles.
Point Sur (proposed light)	N. 63° W. distant 33¼ miles.

San Martin Rock.—Off the cape, and for two or three miles along the shore to the northward, there are numerous rocks close under the shore. But San Martin Rock lies two thirds of a mile ahead off the northern part of the cape. It is a small rock, sharp pointed, somewhat conical in outline, and reaches a height of one hundred and thirty-four feet above high water, from a base of about fifteen yards. It is the Great White Rock.

In the vicinity of Cape San Martin the northwest winds, following the trend of the shore, blow with terrific force, and the smaller coasting steamers, bound northward, are compelled to follow the rocky outline of the coast very closely, generally keeping about three-quarters of a mile out. Even with these strong winds the swell is not heavy, and the water is very bold.

Danger near Cape San Martin.—In May, 1885, a rock was reported about five miles northwestward of Cape San Martin, and one mile (but probably less) off shore. This would place it at the southern part of Coxe's Hole. It was at the time of ordinary low water, and the top of the rock was visible a foot above the water as the large swells would roll in from it. It is a small black rock, and the break upon it was at first mistaken for a whale spouting. Many of the coast-wise steamers keep close in here to avoid the force of the wind and sea, and this reported rock is therefore a danger to them.

Coxe's Hole or Pacific Valley Cove.—This is a bight lying to the northward of Cape San Martin,

*Formerly called Punta Gorda. This head is not the Cape San Martin of Cabrillo, 1542, although named in commemoration of his discovery. The point he so named was the northern extremity of the Sierra Santa Lucia Range, at Point Carmel or Point Pinos.

and between it and Lopez Point. From Cape San Martin to Lopez Point the bearing is northwest by west (NW. by W.) and the distance six and a half miles. The shore retreats two miles to the eastward of this line and forms an anchorage in strong northwest winds. The shore-line is formed by the base of the cliffs which border a narrow table-land at the base of the steep mountains. This mesa is from sixty to one hundred feet above the water. Nearly in the middle of this bight is the mouth of the deep "Redwood Cañon," which heads high in the mountains. Off the mouth of the cañon there is summer anchorage in six to eight fathoms of water, with a good boat landing on a sandy beach. There are a few houses and a school-house here. The remains of an old chapel were still standing in 1885. The cañon is densely wooded with fine redwood trees, ranging from six to four feet in diameter and two hundred feet in height.

Lopez Point.—This is a narrow table land or terrace, eighty or ninety feet high, forming the northwest point of Coxe's Hole. It projects from the base of the mountainous ridge which curves hence to the northward and then sweeps east to Cone Peak or the Twins. This ridge attains twenty-six hundred and twenty feet elevation within one and one-quarter miles behind the point, and reaches five thousand one hundred feet at the Twins.

Lopez Point lies north forty-seven degrees west (N. 47° W.) twenty-five miles from Point Piedras Blancas. Under it there is good northwest lee and anchorage in six fathoms, but there is no boat landing nearer than Redwood Cañon, three miles to the east-southeast. The geographical position of the point is latitude 36° 00′ 15″, and longitude 121° 31′ 22″.

Lopez Rock.—This is an isolated rock lying half a mile off shore, and one and a half miles northwest from Lopez Point. It is estimated to be sixty feet high with a base about ten yards in extent. This rock, lying close under the shore abreast the Twin Peaks, was noted as having four caverns in its side as we passed within one mile of it in 1873.

The Devil's Cañon.—Five miles along shore to the northwest from Lopez Point is the mouth of a deep cañon, with a slightly projecting point one mile to the northwest of it. This point reaches an elevation of thirteen hundred and eighty feet within one third of a mile from the shore. The cañon heads under the crest-line of the range only two and a half miles back from the shore.

Anderson or Hot Springs Landing.—This open and unprotected anchorage is half a mile broad off shore, and about one mile to the west-northwest of Hot Springs Cañon. It is eight and a half miles northwestward from Lopez Point, and seventeen and a quarter miles southeastward from Point Sur. The usual anchorage is just outside the kelp, in seven fathoms of water over rocky bottom. The boat landing is on a rock lying one hundred and ten yards from the shore. Freight is then moved from this rock to the shore over a wire rope. The small coasting steamers land freight here.

The anchorage is marked by the mouth of the Hot Springs Cañon, and the landing obtains its name from four or five jets of steam rising from some warm springs in the canon. They are visible from seaward when a vessel is close in. A station on the north side of the cañon, two-thirds of a mile from the mouth, is fifteen hundred and sixty feet in height, and Rock Slide Station, only one and two-thirds miles to the eastward, is thirty eight hundred and fifty feet above the sea.

From the anchorage the high peak named Anderson, only two and a quarter miles inside the shore-line, rises to four thousand one hundred and forty feet, and bears north; Rock Slide bears east by north (E. by N.).

Partington and West Landing.—This open anchorage is nine and a half miles from the Sur, and three and a quarter miles southeast of Pfeiffer's Point, which forms somewhat of a protection in breaking the heavy northwest swell. There is a small indentation in the shore-line of about two hundred yards in breadth and depth, into which the small coasting schooners are hauled under a chute from the cliffs. They lie here in five fathoms of water to receive tan-bark, etc. Off the anchorage is half a mile outside in twelve fathoms of water over rocky bottom. The anchorage and landing are considered good during the summer months. From the anchorage Pfeiffer's Point bears about west three-quarters north (W. ¾ N.), and Olmstead station, on the coast road, lies about northeast half north (NE. ½ N.), distant two and a quarter miles from the shore and rising to about four thousand feet elevation

Pfeiffer's Point.—This is quite a high and precipitous point, lying north fifty four degrees west (N. 54° W.), forty-six and three-quarters miles from Piedras Blancas, and south sixty degrees east (S. 60° E.) six miles from the Sur, but this last course passes just over Cooper's Point one and a half miles to the west-northwest. The point faces the sea with a front five hundred feet

in height and runs back as a great ridge, curving to the northeast and then east, for five miles to the summit of Station Olmsted, four thousand feet above the sea. This ridge rises to two thousand feet about one and a half miles northeast (NE.) from the point.

On the north side of the point is the opening of a deep gulch with a stream. Under the southeast side of the point there is a good northwest lee under the steep cliffs. The anchorage is in from seven to ten fathoms over clay bottom at the outer edge of the kelp. There is no boat landing, on account of the precipitous cliff. There is no kelp outside.

Over Pfeiffer's Point the Pico Blanco, or Sur Peak, rises to thirty-six hundred and sixty feet on the bearing north by west three-quarters west (N. by W. ¾ W.), distant five miles.

Cooper's Point.—This slightly projecting cliff is four and two-thirds miles southeast by east one quarter east (SE. by E. ¼ E.) from the Sur, and one and a half miles west-northwest (WNW.) from Pfeiffer's Point. It lies just inside the course from Piedras Blancas to the Sur. It is a sharp, narrow point with precipitous cliffs, and rises over one hundred feet above the water. It stretches out to the west-southwest. Behind it the rugged hills rise to twelve hundred feet in three quarters of a mile, and to about three thousand feet in three miles.

Hidden Danger off Cooper's Point.—On the prolongation of Cooper's Point, at two hundred yards distance, is a black, rocky islet (the outer one of three) one hundred yards long, with foul ground and breakers beyond. Outside of this lies a sunken rock with seventeen feet of water upon it, which is not marked by kelp but generally breaks. There is a depth of from six to ten fathoms close around it, and ten fathoms midway between it and the rocky islet inside. It lies six hundred and twenty-five yards west by south (W. by S.) from the point, and is outside the line joining Point Sur and Cape San Martin. From Point Sur it bears south fifty-eight and a half degrees east (S. 58½° E.), distant four and a half miles.

One mile outside the point, the depth of water is twenty-five fathoms; at two miles, sixty fathoms; and at two and a half miles, one hundred and twenty-five fathoms.

The geographical position of the extremity of Cooper's Point, as determined by the triangulation of the Coast and Geodetic Survey, is:

Latitude	36°	14′	58″ north.
Longitude	121°	50′	16″ west.

The Sur River is a small mountain stream emptying to the south under a point of land lying parallel with the coast, and therefore marking the mouth from seaward. It is two and a half miles south sixty-eight degrees east (S. 68° E.) from Point Sur. Off Sur River, to the southward of the kelp field, there is a fair anchorage with good boat landing during the summer months. Some tan bark is shipped from there, and occasionally an otter-hunting schooner anchors there in the latter part of the winter and early spring. To reach the anchorage, pass through an opening in the kelp from which the mouth of the Sur River bears northeast (NE.); when inside the kelp anchor in seven fathoms. The boat landing is under the north point in a small cove on a sandy beach. Freight and lumber have been landed here.

False Sur.—One and one eighth miles east by south half south (E. by S. ½ S.) from the Sur there is a hillock on the shore-line rising to about one hundred and eighty feet elevation, and the captains of the coasting steamers say that in approaching it from the southeast in thick weather before they see the Sur this hillock sometimes deceives them on account of its resemblance to the Sur. The height is deceptive when everything is seen through the fog and mist, and especially if the mist or fog lies low on the water.

Dangers south of Point Sur.—From Cooper's Point to the Sur River the coast is bordered by broken kelp fields for a width of half a mile out to twelve and thirteen fathoms of water. From the Sur River a great field of kelp begins and runs hence to the Sur, extending over a mile from shore.

Very foul ground begins nearly three miles southeast (SE.) of the Sur and extends even outside the limits of the great kelp-field, which reaches out to fifteen and even to eighteen fathoms of water.

The *first shoal spot*, with three and a half fathoms upon it, lies three-quarters of a mile off the Sur River. It has deep water, ten to twelve fathoms, close around it, and eight fathoms on the south edge of the kelp which does not embrace this danger. There is foul ground and breakers between it and the shore. From Point Sur this danger lies south fifty-three degrees east (S. 53° E.), distant two and two-thirds miles.

The *second shoal spot*, with four and a half fathoms upon it, lies outside the limits of the kelp-

field, but with straggling kelp about. This spot lies almost two miles south twenty-nine degrees east (S. 29° E.) from Point Sur, and one and one-eighth miles broad off the coast. The depths around it are five and six fathoms to ten and fifteen fathoms, indicating very broken bottom with possibly bayonet rocks. A vessel would clear it by keeping on the very edge of the compact field of kelp, if she were compelled to do so.

Inside the kelp field there is one rock awash and four or five breakers; and between the kelp field and the low, sandy neck behind the Sur there are four or five other breakers having as little as six feet on the rocks and very foul bottom through the kelp in the vicinity. So the locality is a very dangerous one, although we have come up through these dangers when the weather was clear and the wind was blowing so heavily that all the breakers were in sight. Outside this rocky area the water deepens quickly, and there is a depth of thirty fathoms at two miles from the shore, and forty fathoms at two and a half miles, but the bottom is not regular.

The steamer *Senator*, bound north from San Diego, reported a narrow escape from total wreck three miles south by west (S. by W.) from the Sur. One of the paddle-wheels grazed a sunken rock, and close to the stern-post the vessel struck heavily enough to cause her to leak badly. The bearing and distance must have been reported erroneously, because even if the bearing be assumed south by east (S. by E.) there is forty fathoms at that distance. It is probable she was near this broken ground or inside the kelp on the rock awash, which is one and two thirds miles south forty-three degrees east (S. 43° E.) from the Sur.

The dangers immediately under Point Sur are mentioned in the description of that head.

Shipmasters assert that between Piedras Blancas and the Sur there is something which attracts the north end of the compass needle half a point towards the land; but as this is only experienced occasionally, the cause is more likely to be with the unknown direction and force of the currents, or with uncorrected compasses.

Magnetic Variation.—For January, 1885, the line of equal magnetic declination of sixteen degrees east cuts the coast-line in latitude 36° 12′, eight miles south of the Sur, and moves annually one minute of arc to the northward.

POINT SUR.

Fifty miles northwest three-quarters west (NW. ¾ W.) from Point Piedras Blancas, and fifty-one miles north fifty-six degrees west (N. 56° W.) from Cape San Martin, is Point Sur (formerly called Los Lobos*) making out two-thirds of a mile from the steep mountain side. This high land breaks the general straight line of the coast between Point Pinos and Cape San Martin, and is a well known point of departure for vessels going north or south. From the north it is the first point made after leaving Point Año Nuevo.

As seen from the north or south, at a distance of ten miles, Point Sur appears as a high, bold, round topped islet; but upon approaching it a low neck of land is seen connecting it with the main. This is a very notable feature. This neck consists of sand dunes, which are formed by the sand drifting from the northwest, and it is not over twenty feet above the sea. The extent of the rock is about six hundred yards nearly east and west by four hundred yards in width. Its height is three hundred and fifty-eight feet, and the lower part is extremely broken and precipitous for sixty feet above the sea, with many rocky patches uncovering close under it to the westward at low water. It is particularly black at night and can not be mistaken.

There is a *boat landing* close under the Sur at the south side of the neck, where the kelp recedes, and the coasting steamers sometimes land freight there. The three fathom curve keeps close under the southeast shore of the head; but inside the six-feet line there are two visible rocks, which the larger one under the cliff breaks part of the swell. The other is close to the east landing. The low-water beach is twenty-five yards wide at the joining of the beach and head.

There is one known *hidden danger* off the head. It is a rock with twelve feet of water upon it, and it lies four hundred and fifty yards outside the Sur, with eight fathoms of water inside and fifteen fathoms close outside of it. There is no kelp to indicate its position, which is seven hundred yards south sixty-four degrees west (S. 64° W.) from the highest part of the Sur.

The depth of water at one mile broad off the Sur is twenty-seven fathoms, and at two miles it is thirty-six fathoms, with regular bottom.

Tides.—The times and heights of the high and low waters under the Sur can be taken

*Tebenkoff calls it Point Lobos in his atlas.

Pico Blanco, 3,660 feet.

Sur, SE. ¼ E., 5 miles.

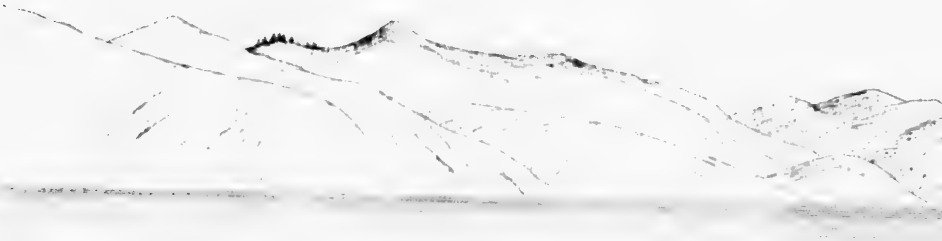
The Sur.

Mount Carmel, 4, SE. by E. ¼ E.

The Sur, SE. ¼ S., 19 miles.

Pico Blanco, 3,660 feet, E., 8 miles.

The Twins
5,100 feet, E.8E.,



Pico Blanco, 3,660 feet
SE. ½ E., 17½ miles.

Mount Carmel, 4,417 feet
SE. by E. ½ E., 19 miles.

Pico Blanco, 3,660 feet,
SE. ½ E., 20 miles.

The Twins,
5,100 feet, E.SE., 29 miles.

The Sur, SE. ½ E., 5 miles.

The Sur.

Pico Blanco, 3,660 feet,
SE. ½ E., 20 miles.

The Sur,
SE. ½ S., 19 miles.

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The Sur NW. ¼ Nico, 3,860 feet, N. by W. ½ W., 12 miles.

The Sur,
NW. ¼ W., 26¼ miles.

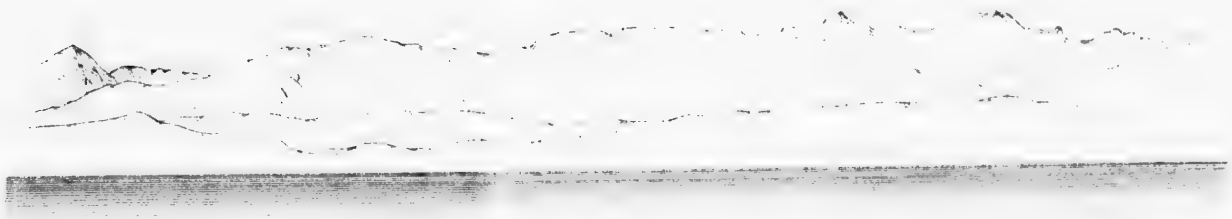
The Sur NW. ¼ N., 11 miles

Light house site, 240 feet.
Pico Blanco, 3,660 feet, 7
The Sur, N. 65° E., 2¼ or 3 miles

Pico Blanco.

Pico Blanco, 3,660 feet, N. by W. ¼ W., 12 miles.

feet. Pico Blanco, 3,660 feet, 7 miles.
ar. N. 65° E., 2¼ or 3 miles



Pico Blanco, 3,660 feet,
N. by W. ¼ W., 12 miles.

Mount Carmel, 4,417 feet,
N. ¼ W., 15 miles.

Pico Blanco, 3,660 feet,
N. by W. ¼ W., 10 miles.

The Sur, NW. by N. ¼ N., 7 miles.

same as at Monterey. The greatest range of tides observed during the progress of the hydrographic survey was seven and nine-tenths feet.

POINT SUR WHISTLING BUOY.

A *whistling buoy of the first class*, having *black and white perpendicular stripes*, has been placed off Point Sur in twenty-three and a half fathoms of water, south forty-two and a half degrees west (S. 42½° W.) distant one mile (less one hundred yards) from the highest part of the head. It can be passed closely on either side. The whistle is sounded by the action of the sea and gives from twenty to thirty continuous blasts each minute. "With a heavy sea and fresh wind from west northwest we heard the sound of the buoy one mile to leeward and half a mile to windward of it." In December, 1884, we heard it from a distance of nearly two miles, giving frequent blasts from one-half to three quarters of a second duration.

The geographical position of the summit of Point Sur, as determined by the Coast and Geodetic Survey, is:

Latitude	36°	18′	13″.3	north.
Longitude	121°	53′	58″.0	west.
Or, in time	8h	07m	35s.87.	

In January, 1885, the magnetic variation was 16° 00′ east, and is decreasing annually one minute.

From Point Sur we have the following bearings and distances to prominent points:

Point Arguello bears	S. 45°	E. distant 121	miles.
Point Buchon bears	S. 55	E. distant 80	miles.
Piedras Blancas Light-house	SE. ¾	E. distant 50	miles.
Cape San Martin	S. 58	E. distant 31	miles.
Point Cypress	N. 28¾	W. distant 16¾	miles.
Point Año Nuevo Fog-signal	N. 40	W. distant 53	miles.
Pigeon Point Light-house	N. 44	W. distant 58	miles.

and on the latter course the light on Point Pinos will be abeam at eighteen miles from the Sur, and distant six and a half miles from the ship.

Landmarks.—There are two notable peaks close behind the Sur on the crest-line of the Sierra Santa Lucia.

Pico Blanco, the *Sur Peak* of the coasting captains, is a short-pointed, white-topped mountain, lying four and a quarter miles north sixty-five degrees east (N. 65° E.) from the Sur. It is about twenty-six hundred feet above the sea. When the Sur itself can not be seen on account of low fog or smoke haze under the shore-line, the tops of the mountains are frequently discernible, and the Sur Peak becomes one of the special landmarks. In running along the coast from the northward, from Point Año Nuevo, and the Sur being invisible, the course is continued until this peak is abeam when the Sur has been passed one mile; and then the course is changed for the Piedras Blancas. And in coming to the northward from Piedras Blancas the course must be continued until the peak bears north sixty five degrees east (N. 65° E.), directly over the Sur, when it is changed for Point Año Nuevo or for Point Cypress.

The second peak is *Mount Carmel*, or Boulder Mountain, which has a round-topped, treeless summit, and lies seven and one-ninth miles north thirty-three degrees east (N. 33° E.) from the Sur. It rises to an elevation of forty-four hundred and seventeen feet, and is visible from seaward about seventy-five miles.

This peak is used by some of the captains when coming from the southeastward. They continue their course until the mountain is abeam when they will be half a mile past the Sur, and the course is then changed for Point Cypress or Point Año Nuevo.

Pine River Hill is a low mountain under the flanks of the coast range: it is one and a half miles north fifty one degrees east (N. 51° E.) from the Sur, and is thirteen hundred feet high. It will sometimes be made out when the higher and more distant mountains are in the clouds.

Light House at Point Sur.—A first-order Light will be established low down upon the face of the seaward slope of Point Sur, and the light house is now being erected. The need for such an aid to navigation is particularly great at this place because there is no first-class sea-coast light nearer than Pigeon Point, fifty-eight miles to the northwest, and Point Piedras Blancas, fifty miles to the southeast. At the point selected, the Light will be about one hundred and twenty feet above the water and be visible close under the north and south shores.

The geographical position of the Light-house is—

Latitude	36°	18′	18″.7 north.
Longitude	121°	54′	08″.9 west.
Or, in time	8h	07m	36.6s.

In the position of the Sur, Vizcaino's chart has a slight projection to indicate this notable feature, with the legend "Point appearing like an island." In his narrative he says the high mountains four leagues south of Carmelo Bay are the landfall which ships from the Philippine Islands usually made. (1602.)

Vancouver, in passing down the coast in 1793, thought this "small, high, rocky lump of land, lying nearly half a mile from the shore," was detached and that it formed an island. But he gave it no name.

The point received its name from the Mexican grant of land embracing it, which is known as "El Sur."

Deep-sea Soundings off the Sur towards the Southwest.—Two lines of deep-sea soundings were run broad off the coast, under the flank of the Sierra Santa Lucia, by the U. S. steamer *Tuscarora* in 1873. We note here the first line which was run on the 24th and 25th of December:

Miles from the shore.	Latitude north.	Longitude west.	Depth, fathoms.	Temperature		Character of bottom.
				Surface.	Bottom.	
2	36 13	121 50	207	56.0	.....	Greenish-black sand with shells.
8	36 10	121 56	686	55.0	37.3	Very hard greenish-black sand.
15	36 06	122 04	988	55.0	35.4	Rock.
27	36 02	122 12	882	54.9	35.6	Hard gravish black sand.
40	35 52	122 29	1,814	55.0	33.3	Greenish mud and sand.
62	35 40	122 52	1,935	55.0	33.7	Greenish mud.

This line of soundings is nearly at right angles to the line of the Sierra Santa Lucia, and the depth of the plateau of the Pacific Ocean at two thousand fathoms, distant sixty-two miles from shore, is confirmed by the two series of soundings to the north and to the south.

Deep-sea Soundings off the Sur toward the West.—On the 21st and 22d December, 1873, the U. S. steamer *Tuscarora* ran a line of soundings inshore from the plateau of the Pacific toward the northern end of the Sierra Santa Lucia, striking the coast-line between Point Sur and Carmel Point. The following table gives the positions, depths, etc., of each sounding.

Distance from the shore near Carmel.	Latitude north.	Longitude west.	Depth, fathoms.	Temperature		Character of the bottom.
				Surface.	Bottom.	
7½	36 25	122 04	190	56.0	.....	Grayish black sand.
10	36 26	122 09	486	55.0	38.8	Dark mud
28	36 28	122 31	1,170	55.5	34.8	Greenish mud with black sand
47	36 27	122 54	1,650	54.0	34.0	Greenish mud.
61	36 32	123 11	1,686	54.0	33.3	Greenish mud, no ooze.
83	36 34	123 37	1,040	53.2	.....	Do.
98	36 37	123 56	2,104	53.8	33.1	Do.

It will thus be seen that the plateau of the Pacific was found about seventy eight miles off the coast of Point Año Nuevo. It is a curious fact that the sounding which reached one hundred and four fathoms is within two or three miles of one of the assigned positions of Vitula Shoal, with a corroborating sounding of twenty-one hundred and sixty-eight fathoms one or twelve miles to the northwest and near another reported position of the same shoal.

Point Sur to Point Pinos.—North of Point Sur the general coast line is quite straight to south head of Carmel Bay, in no place retreating over a mile to the eastward. The detail is quite irregular and the shore is closely bordered by numerous rocks and rocky islets, between them are inside the line between the points. From the outer limit of the Sur to the extreme Point Cypress, which forms the northwest point of Carmel Bay and is the furthest point out, the distance is seventeen miles and the bearing north thirty degrees west (N. 30° W.), passing close to Whaler's Rock, off the south of Carmel Bay, at thirteen miles.

The high mountains close behind the shore-line begin to decline in elevation as they are followed northward until they are cut by the valley of the Carmel River. They are mostly covered with chaparral and pine, the latter very thick in the gulches.

The water is very bold along this stretch of the coast. The ten-fathom line is never more than one third of a mile from the shore, and the twenty-fathom line about two-thirds of a mile; thence seaward the bottom is quite regular, increasing in depth to fifty fathoms at two and a half miles from the shore. There are no known hidden dangers off this short stretch of coast, but the following points, rocks, and rocky islets are noted:

The Ventura Rocks.—These are two moderately high rocky islets lying two and one fifth miles north northwest (NNW.) from Point Sur, and barely half a mile off the shore. They lie northwest and southeast (NW. and SE.) from each other, and the southeast one, which is fifty yards in extent, is the larger. There is ten to fifteen fathoms close around them and deep water, ten to twelve fathoms inshore, except on the *sunken rock* which lies one hundred and ninety yards northeast two-thirds east (NE. ⅔ E.) from the highest part of the small northern rock.

Three-quarters of a mile north northwest (NNW.) of the Ventura Rocks a line of rocks and rocky islets begins close under Flat Point and runs for a mile and a half parallel with the coast-line and only four or five hundred yards from it, with ten fathoms along their outer limit; thence northward the ten-fathom line is close inshore.

In April, 1875, the steamer *Ventura*, having taken her departure from Point Año Nuevo, struck upon the Ventura Rocks in thick weather, and was stranded one mile to the southeastward under the rocky point about half-way to the Sur; hence their name.

Soberanes Point, eight and a half miles northwestward from the Sur, is not a prominent projection, as it hardly breaks the general outline of the coast, but it is known by the isolated hillock, two hundred feet high, just inside the shore line, with a bare, grassy ridge behind it rising to over sixteen hundred feet. Off the south part of the point, about two hundred and thirty yards off shore, and half a mile southeast (SE.) from the outer Piedras Lobos, is a *break* with ten fathoms close outside.

One mile south fifteen degrees east (S. 15° E.) from Soberanes Point and over half a mile broad off shore, is a patch of broken ground almost a quarter of a mile in extent within the ten-fathom line. The least water found in it is six and three-quarters fathoms, but there may be less. Close outside of it there is a depth of from eleven to thirteen fathoms, and between it and the shore from thirteen to eighteen fathoms. The locality has not been minutely examined.

Piedras de los Lobos.—This cluster of two principal rocky islets and three small rocks lies about half a mile north of Soberanes Point and nine miles north twenty-eight degrees west (N. 28° W.) from the Sur. There is broken ground between them and the rocks close under the point, and at least one *breaker* in the passage, but outside, the depth is twenty fathoms close to them. No kelp is laid down about them, but it may exist in favorable seasons.

Yankee Point.—This point is two and one-sixth miles northwest by north (NW. by N.) from the Piedras de los Lobos, and one and two-thirds miles southeast by south (SE. by S.) from the outer Whaler Rock at the south point of Carmel Bay. It is somewhat prominent, because the shore retreats eastward both south and north of it. The cliffs of the point are about one hundred feet high, very ragged, and closely bordered by many rocks. The surface of the rising land inside the point is not timbered for one-third of a mile; then pine and oak cover the middle height of the mountain side.

Off Yankee Point the soundings are bold, but the bottom is badly broken to the northwest, with eleven fathoms the least water found. The thirty-fathom curve is half a mile off shore; the fifty-fathom curve is one mile; the seventy-fathom curve is three miles, and the eighty-fathom curve is four miles off shore. North of this is a deep submarine valley hereafter described.

Yankee Point Breaker.—This danger lies one and five-sixths miles north thirty-five degrees west (N. 35° W.) from the Piedras de los Lobos, and just inside the ten fathom curve. It is one-quarter of a mile off shore, and only one-fifth of a mile inside the line from the Sur to Point Cypress.

Hamilton's Landing.—It is reported that a chute landing, known as Hamilton's Landing, has been built out from the shore just to the northward of the Ventura Rocks. A saw-mill with a capacity of twelve thousand feet of lumber per day has been erected there, and lumber and tan bark shipped thence.

CARMEL BAY.

This is the broad, open bay first made thirteen miles northward of the Sur, and lying five miles southward of Point Pinos. It is readily distinguished from seaward because the crest line of mountains, which has been unbroken from near Piedras Blancas, breaks down behind this bay and gives passage-way to the Carmel River.

The bay lies between Point Cypress, forming the northwest point, and Point Carmel, which is the southwest point. Between these two points the bay is three and seven-eighths miles across, although contracted about a mile by Timber Point, lying nearly southeast from Point Cypress. From the line joining the two points, the greatest recession of the shore to the eastward is two miles in the northeast cove and one and seven-eighths miles in the southeast angle of the bay. The eastern shore of the bay is two and a quarter miles long about north by west half west (N. by W. ½ W.), with comparatively low cliffs. Two-thirds of a mile north-northwest (NNW.) from the southeast angle of the bay, the Carmel River* debouches into the bay through a mouth about one hundred yards across, and in the extreme southeast part opens a small stream called the San José Creek. The eastern shores for a quarter of a mile back are destitute of trees, but pines and oaks thence cover the greater part of the surface.

Point Carmel.†—This is the southwest point of Carmel Bay and is locally known to the whalers and others as Point Lobos. It is a very irregular, jagged point of rock, nearly one hundred feet high, with numerous rocks close under the cliffs, several rocky islets nearly one third of a mile off, and one breaker half a mile off. The extremity of the point is sparsely covered with pine trees, and half a mile inside is a rocky hillock, known as Whaler's Knoll, whence a lookout for whales is kept. Inside of Whaler's Knoll the pines cover the surface well up the mountain side.

Dangers off Point Carmel.—These are, as far as known, with one exception, all visible rocks, and consist of several compact clusters of rocks and rocky islets known as the Whaler Rocks, lying about half a mile from south to south-southwest (from S. to SSW. from the extremity of the point. The one sunken rock lies about three hundred yards south-southeast (SSE.) from the outermost of these clusters.

Point Cypress.‡—This is the northwest point of Carmel Bay, and is a comparatively low, rocky point stretching out nearly two miles beyond the general trend of the coast. The cliffs are steep, and a great number of rocks lie close under them, whilst a few stretch out one-fifth of a mile. The point is covered by a dense growth of Monterey cypress coming down nearly to the extremity of the cape, and towards the bay they reach the edge of the cliffs at Timber Point and Pescadero Point. The upper branches of the cypress trees are spread out by the influence of the strong, prevailing winds and present a flat or umbrella-like appearance; their trunks are gnarled and dragged. The land behind rises to several hundred feet elevation and is densely wooded.

The geographical position of Point Cypress, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	36	34	41 .8	north.
Longitude	121	58	38 .8	west.
Or, in time	8	07	54 .9.	

From Point Cypress we have the following bearings and distances to prominent points:

Point Sur	S.	28½°	E.,	distant 16¾ miles.
Point Pinos	N.	13	E.,	distant 4 miles.
Point Año Nuevo fog-whistle	N.	44	W.,	distant 36⅝ miles.

The distance to Point Piedras Blancas is sixty-seven miles, but the points are not intervisible.

Cypress Rock, a small rock, forty yards in extent, lies three hundred and thirty yards to the west by west (NW. by W.) from the extremity of Point Cypress. South of it lies a sunken rock which is described below among the hidden dangers.

Timber Point lies one mile southeast (SE.) from Point Cypress. It is a very slightly projecting rocky cliff, covered with cypress to the edge, and bordered by rocks close under it.

Pescadero Point lies two miles south sixty-seven and a half degrees east (S. 67½° E.) from Point Cypress, but they are not intervisible on account of Timber Point. The shore line from Point

* Rio Carmelo was the name applied to this stream by Vizcaino in December, 1602.

† On the old Spanish charts Punta de los Lobos.

‡ In Dalrymple's copy of the sketch of Monterey Bay by Don Josef Tobar y Tamariz he calls this Point S[illegible], evidently a mistake for Point Cipresal. It was called Point Pinos by the land expedition of 1769.

Point Cypress,
N. by W. ½ W., 14½ miles.
White rock
Two Trees. 1,900 feet.
N. ½ E., 12 miles.

Rock, N. by W. ½ W., 3½ miles.
Point Cypress.
Cypress trees.
Rocky cliffs.

Point Cypress, SE. by S. ½ S., 4 miles.
The Sur.
Cypress Rock.

Cypress is densely wooded to the edge of the cliffs, and guarded by many small rocks. The point rises in a rocky bluff to one hundred feet. In a restricted sense this point might be considered ...ner north point of Carmel Bay.

...*hidden dar jers* off these points are as follows:

...approaching Carmel Bay from the northward, care should be taken to avoid the sunken ... th six feet of water upon it, and marked by a breaker, which lies three hundred and thirty ...vest from Point Cypress, and two hundred and eighty yards south from Cypress Rock, which ...mark to locate it. There is a depth of ten fathoms close outside of it.

...*eaker* with ten feet of water on the sunken rock lies half-way between Point Cypress ...mber Point and a quarter of a mile off shore. From Cypress Rock it bears south twenty- ...grees east (S. 29° E.) distant two thirds of a mile; it lies on the range of Timber Point and ...ro Point. There is deep water around it.

...*breaker* with deep water around it lies nearly half way between Timber Point and Pesca ...Point and a little over half a mile from shore. There is a depth of fifteen fathoms inside of ... deep water continues to the shore. Straggling kelp is found outside.

... lies one and one-third miles south forty two degrees east (S. 42° E.) from Point Cypress, ...o thirds of a mile south sixty-three degrees west (S. 63° W.) from Pescadero Point.

...*chorage in Carmel Bay.*—The north anchorage in the bay, east of Pescadero Point, is ... by very foul ground, rocky islets, and straggling kelp to the eastward. But it is reported ...ssels knowing the local peculiarities of the place find this the better anchorage. The old ...rage was in the southeast part of the bay, in a cove about half-way between Point Carmel ...s southeast angle of the bay. This cove is in part formed by rocks and a rocky islet on the ...de, and by rocks on the eastern side, although a depth of five and six fathoms is found ...the two mainland points, which are only three hundred yards apart. It is partly protected ...the prevailing summer winds by Whaler's Knoll. This cove was formerly occupied as a ...g station.*

The northwest swell does not roll into this part of the bay so much as would be expected, ...e of the existence of the very deep water that is found in the head of the submarine valley ...ong in here.

... the winter, during southerly weather, the swell sets into Carmel Bay very heavily at times. ...ing that season, when the weather is pleasant, the surveying steamer always experienced ... from the northward and eastward blowing out of the bay in the early morning.

...*marine Valley at Carmel Bay.*—Another example of the submarine valleys of the coast ...heading into Carmel Bay, where there is a depth of twenty-five fathoms of water within ...dred yards of the shore. The fifty fathom curve on the south side of the valley is nearly ... with the south shore at a distance of only one-quarter of a mile. The two hundred-fathom ... only twelve hundred yards north of Point Carmel. The two hundred and fifty fathom ... of this valley heads at a position less than one mile north sixty degrees west (N. 60° W.) from ...Carmel, and the three hundred fathom curve, one and one-quarter miles north eighty three ...west (N. 83° W.) from the same. There is a secondary heading of this submarine valley ...the northeast cove of the bay, so that the twenty five-fathom curve is within half a mile ...Pescadero Point, and the one-hundred fathom within three quarters of a mile. A third branch ... parallel with the outer shore of Point Carmel, and the two hundred fathom soundings ...mile southwest by west (SW. by W.) from Whaler Rocks. The outer part of this sub ...e valley, from three hundred to three hundred and fifty fathoms deep, appears to come in ...northwest by north (NW. by W.), parallel with the general trend of the shore, with a ... less than half a mile between the three hundred fathom lines; and it then curves to the ...theast (ENE.), parallel with the south shore of Carmel Bay. The sharpest descent is ... fathoms to four hundred and seventy five fathoms in two thirds of a mile, or two thou- ...e hundred and fifty feet in three thousand five hundred and twenty feet.

... the northeast part of Carmel Bay, high up on the shore, is found a large deposit of sand ...of almost pure silica, valuable for the manufacture of glass. This was formerly trans- ...pack mules to Monterey, and shipped thence to San Francisco.

... Mission del Carmelo is situated but a short distance from the shores of the bay, and can ... certain directions from the water when passing or entering the bay.

...r the abolishment of the Society of Jesus in Lower California by the Emperor Charles

* See Scammon's Marine Mammals of the Northwest Coast of America.

III of Spain, with the transfer of the administration of the missions to the Dominican monks, and of the property to the Franciscan order, the Visitador Don Josef de Galves, of the latter order, in July, 1768, visited San Diego and Monterey for the purpose of establishing missions. On the 3d June, 1770, he founded that of San Carlos de Monterey, now usually called the Carmel Mission.*

Point Cypress to Point Pinos.—The distance from Point Cypress to Point Pinos is four miles, and the bearing north thirteen degrees east (N. 13° E.). The shore line is nearly straight, and is formed of low, rocky cliffs closely bordered by small rocks. The line of timber falls back one-third of a mile from the shore and the cypress gives place to the pine. The height of the land decreases towards Point Pinos, and sand dunes mark the northern part. These high, white sand dunes are quite conspicuous, even by moonlight, contrasted with the black forests behind them.

Pyramid Point.—The line joining the two points passes over the slightly projecting Pyramid Point, which lies half way between them. There are two half-mile low water sand beaches lying just northeast of Pyramid Point.

Dangers.—No hidden dangers are known off the shore except a sunken rock one-quarter of a mile north by west (N. by W.) from Pyramid Point, [illegible] and three-quarters miles northeast by quarters east (N. ¾ E.) from Point Cypress.

There is a *very rocky patch* two hundred and fifty yards directly off Pyramid Point; and one-third of a mile northwest by north (NW. by N.) from the point there is foul ground and rocks and three quarters fathoms. Straggling kelp in ten to thirteen fathoms is found half a mile inside the point.

The kelp line is not continuous along this shore, but is found generally in small patches in ten to thirteen fathoms of water.

The ten-fathom line is less than half a mile off shore and nearly uniformly distant. At a mile the depth is twenty five fathoms; at two miles it is fifty fathoms, and at three miles seventy five fathoms. For the deep-sea soundings off this part of the coast see page 136 (Sur).

POINT PINOS.

This point is the northern termination of the long and elevated range, named the Sierra Santa Lucia, which rises to a height of forty four hundred and seventeen feet at Mount Carmel, sixteen miles to the southward; and six thousand feet at the peak of Santa Lucia. But the range is broken through by the Carmel River; and lying back of Point Cypress and Point Pinos is a comparatively low isolated mountain mass forming the extreme end of the mountains. This northern extremity of the range is densely covered with pines, which come within a quarter or one-third of a mile of the shore. The extreme point makes out low, rocky, and irregularly rounding, with visible rocks reaching out for a quarter of a mile. Inside the shore-line the land gradually rises upward to the edge of the forest. The open border is generally grass-covered to the east, but with sandy patches and dunes to the southward.

Behind this point the coast line continues rocky and turns sharply to the east southeast for three miles to the harbor of Monterey, whence a sand beach of many miles trends to the northward as hereafter described. Behind this sand beach are broad, low lying lands, an extensive undulating country to the eastward, with many tributary valleys coming in from all directions.

These physical conditions make Point Pinos a notable and easily recognized landmark when seen from the northwest, however, it is projected against the higher masses of the Sierra Santa Lucia, whilst the jutting out of the land to the westward is the lateral push of the mo[illegible]

* The overland expedition which left San Diego July 14, 1769, to discover Port San Francisco, was to return after reaching Half Moon Bay, and, failing to recognize the harbor of Monterey, erected a large cross on the south side of Point Pinos to attract the attention of the expedition coming by sea. On the cross cut the legend, "Dig at the foot of this and you will find a writting," which was an account of their [illegible]. Father Crespi says: "This cross was erected on a little hillock close to the beach of the small harbor on the south side of Point Pinos." "On the other side of the point" they erected another cross with the carved legend "The overland expedition from San Diego returned from this place the 9th December, 1769, starving." The second is evidently Carmel Bay, which Father Crespi called the Bahia de los Pinos; Point Pinos is the whole point Point Pinos and Point Cypress. But the "other side of the point" can not be located; it must be the other side of the bay.

Point Sur. Point Pinos from this direction would be indistinguishable but for being marked by ... d dunes with dark land on either side. If there is a haze in the Carmel gap, the pine-cove... l point looms up more prominently and plainly.

... ography.—The line of three fathoms depth extends nearly half a mile outside Point Pinos, when the depth suddenly increases to ten or fifteen fathoms, and at one mile reaches forty or forty-five fathoms. The three-fathom line follows the shore within a third or half a mile into Monterey Harbor, whilst outside of that line the depth increases as suddenly as off the point. Vessels should always give Point Pinos a good berth, as a very heavy westerly swell almost invariably sets upon it.

POINT PINOS LIGHT-HOUSE.

... is a secondary sea coast light, situated upon the northwestern part of Point Pinos, at the ... the growth of pines. The building is a gray, granite dwelling, one and a half stories in ... surmounted by a round, white tower and black lantern, which is thirty-five feet above the ... The illuminating apparatus is of the third order of Fresnel, and shows a *fixed white* ... sunset to sunrise. It illuminates two hundred and eighty-eight degrees of the horizon, ... sixteen degrees east (S. 16° E.) round by west and north to south eighty-eight degrees ... E.). The focal plane is elevated ninety-one feet above the level of the sea, and with ... clearness of the atmosphere the light should be seen from a height of

10 feet at the distance of 14.6 miles.
20 feet at the distance of 16.1 miles.
30 feet at the distance of 17.2 miles.

... graphical position, as determined by the Coast and Geodetic Survey, is:

Latitude	36°	37′	51″	north.
Longitude	121°	56′	02″	west.
... time	8h	07m	44.4s	

... primary astronomical station of the Coast and Geodetic Survey (1851) is seven hundred ... yards nearly east of the light.

... this station the magnetic variation was observed to be 14° 58′ east in February, 1851, and ... east in September, 1873. The computed variation for January, 1885, is 16° 02′ east, with ... ent yearly increase of one minute.

... Point Pinos Light we have the following bearings and distances to prominent objects:

The mouth of the Salinas River	N. 16½° E.,	distant 13 miles.
Pajaro Landing	N. 5° E.,	distant 15 miles.
Santa Cruz Light-house	N. 20½° W.,	distant 19½ miles.
Point Año Nuevo Fog-whistle	N. 50° W.,	distant 34½ miles.
Pigeon Point Light-house	N. 50° W.,	distant 33½ miles.
Southeast Farallon Light-house	N. 54½° W.,	distant 81 miles.

... distance to Point Sur is twenty-one miles, and to Piedras Blancas Light seventy-one miles; ... are not intervisible. Vessels bound northward sight Point Pinos Light and then lay their ... pass just outside of Point Año Nuevo, upon which is a steam fog-whistle.

... *whistling buoy, painted with black and white perpendicular stripes*, has been moored in twenty ... quarter fathoms of water, over hard, sandy bottom, off Point Pinos. It is located by being ... of the Light-house and the white rock off the point, at a distance of three-eighths ... the rock, and five hundred yards outside the five-fathom line. The following bearings and distances are given to prominent objects:

Outer white rock	SE. ½ E.	½ mile.
... rock	SE. by E. ½ E.	1½ miles.
... Pyramid	S. ½ W.	2¼ miles.
... Cypress Rock	S. by W.	4¼ miles.

... buoy is sounded by the action of the sea, and gives from twenty to thirty blasts per minute. ... was placed August 24, 1888.

... have found a manuscript chart of Point Pinos to Monterey Harbor, made from the hydrographic survey of the U. S. ship *Warren* in 1848.

... graphical and hydrographical sheet of Monterey Harbor, including Point Pinos, was ... by the Coast Survey in 1852. There has since been published a sheet exhibiting Monterey ... to the westward of Santa Cruz, and another general chart embracing the coast ... Pinos to Bodega Head. Two charts, on a large scale, to exhibit the topography and ... from Pinos towards the Sur, have been recently published.

Either Point Pinos or the high mountain mass to the southeast of Carmel Bay was named Cabo de San Martin by Ferrelo in 1542, and noted as the termination of the range since known as the Sierra Santa Lucia. But he was driven off the coast before reaching it.

In De Fer's Atlas, 1709, it is called P. de Carinde.

It is mentioned by Admiral José Cabrera Bueno Gonzales in 1734 as being at the southern part of a great gulf (ensenada), where "the coast stretches out at a point of low land heavily timbered down to the shore, and named the Punta de los Pinos, which is in latitude 37 degrees. As seen from the northwest it is a small hill, two leagues in length from NE. to SW., and all covered with pine trees;" and that to the southward of the point a cluster of cliffs makes a good landmark to know it by.

BAY OF MONTEREY.

General features.—Point Pinos forms the southwest point of this bay, and Punta de la Santa Cruz (forming the western shore of the anchorage of Santa Cruz) the northwest point. A line joining the light-houses upon these two points runs north twenty-nine and a half degrees west (N. 29½° W.) nineteen and one-half miles, and the greatest depth of the bay to the eastward is near the mouth of the Salinas River, nine and three-eighths miles from this line. It might fairly be affirmed that the northwest point of the bay is at least four miles west of Santa Cruz, but the shore is very gently rounding, and no specific name has been given to it.

The mountain chain of the Sierra Santa Lucia from the southeast, terminating at Point Pinos, and the southwest flank of the mountain mass of the peninsula of San Francisco pressing over Santa Cruz, make two remarkable landfalls for this bay; the more especially as the eastern shore is low and sandy, and bordered by low lands which gradually rise to rolling hills increasing to mountains well to the eastward. In approaching the bay from seaward these peculiarities give it the appearance of a great gulf.

The waters throughout the bay are deep, with no known hidden dangers whatever. The whole line of the sandy beach or low bluffs may be approached with confidence. The depth, however, is not regular, nor does it increase gradually from the shore. In the southern part, the depths range from fifty-five fathoms at the outer limit of the bay to thirty fathoms at one and three quarters miles from the beach, and to ten fathoms at one half to three-quarters miles from the beach. In the northern part, there is a fairly uniform plateau with the thirty-fathom curve six miles south of the head of Soquel Cove, and decreasing regularly to the shore. But these regular approaches are divided by a remarkable *submarine valley*, similar to those off Point Hueneme and off Carmel Bay. This valley lies in the center of Monterey Bay, and has been to some extent traced out. The head of the valley lies five-eighths of a mile south of the Salinas River, and the twenty-fathom line is only a quarter of a mile off the beach, the depth increasing to fifty fathoms in the next quarter of a mile. At this distance from shore the twenty fathom lines are three eighths of a mile apart. The general direction of the valley for the next two miles is southwest half west (SW. ½ W.), where we find a depth of one hundred and seventeen fathoms, and the fifty-fathom lines lie about five-eighths of a mile apart; thence the valley runs about west, reaching a depth of one hundred and seventy fathoms in a mile, and two hundred and forty fathoms in three and a quarter miles, with forty-two fathoms less than a mile to the north of it. The soundings are not numerous enough to trace its outlines in deep water: but the indications are that for ten miles of its length it runs south sixty degrees west (S. 60° W.), with no bottom at three hundred and fifteen fathoms. The only available boat landing upon the beaches of the bay shores is at the head of this submarine valley. There are no indications on the land of this peculiar formation, except that at its head the bay very gradually reaches its greatest extent.

The Monterey Wind-gap.—The great mountain barriers north and south of Monterey Bay, and the receding of the shore to the eastward, offer a broad entrance for the cold and foggy northwest winds of summer. Their influence is felt, not only along the coast line, but through the entire opening upon the bay. The fogs are very heavy and wet around the southern part of the bay, completely envelope Point Pinos. They drive over the harbor of Monterey and well into the Salinas Valley; along the whole sandy shore they frequently prevent its being seen for a long time, and vessels feel their way by soundings and the rote on the shore as close in as possible. Under the northern part of the bay the fogs do not envelope the shore so closely and densely, and on the hillsides sloping to the south the climate is clear and warm. Soquel Cove and Santa Cruz Harbor are often clear whilst the fog is dense to the southward and eastward. The

mountain shoulder making southwest from Mount Bache seems to break the force and change the direction of the wind, and to partly dissipate the fog on account of the heated air along its gulches and its timbered sides.

Harbor of Monterey.—From Point Pinos to the anchorage off the town of Monterey the general course is east by south half south (E. by S. ½ S.), and the distance three miles. The shore toward the town is rugged, composed of granite, and covered with grassy slopes which are backed by a heavy growth of fir. In the bends of the shore-line short, low, sand beaches are seen, and show quite bright in moonlight. To the eastward of the town is a long, sandy beach, backed by sand dunes of slight elevation. Behind the sand dunes the hillocks are covered with grass and sparsely covered with oaks. For a distance of ten miles along this beach the line of three fathoms lies one cable and fifty yards off shore, the water deepening rapidly beyond that, and the bottom almost everywhere hard sand.

The harbor is broad open to the north northwest, but as it is quite a deep pocket, protected by Point Pinos, which extends over two miles farther north, there is moderately good anchorage. There are two wharves at Monterey: the old shipping wharf and the railroad wharf. The latter was badly damaged in 1883, and now but a few piles remain. The coasting steamers lie alongside the old wharf, which is built in the southwestern bight of the harbor; and sailing vessels discharge and receive freight there. This wharf is eight hundred feet long (December, 1884), and has an angle at less than one-third of its length from the outer end, turning it toward the west. There is a warehouse near the outer end, from the front end of which a *red light* is shown when the steamers are expected in at night. There is a depth of sixteen feet of water at the outer end, and the steamers generally lie on the east side of the wharf, head in to south by west, with the stern projecting beyond the wharf.

By anchoring well in at the western side of the harbor, vessels will avoid much of the swell that comes in with the heavy northwest winds. This swell, however, is never sufficient to make the berth there dangerous. The influence of the swell is felt at the wharf more than at the anchorage, owing to the undertow, but less here at Monterey than in any of the open ports on the southern coast. In heavy southerly weather Point Pinos breaks the swell, but the wind draws strong off shore over the anchorage. The water shoals from fifteen to three fathoms in a distance of three hundred yards, and the lead should be used to avoid running in too far.

Sailing vessels coming from the northward, bound to Monterey, follow the coast from Point Año Nuevo to Point Santa Cruz, then run well into the bay, but not too far, for fear of losing the wind to avoid the set of the heavy swell rolling toward the beach. Leaving Point Santa Cruz and keeping on a southeast by east (SE. by E.) course about fifteen miles, will bring vessels into seven and five fathoms and nearly two miles from the beach; thence a south course for eight miles will bring them to the anchorage in ten fathoms, and half a mile from the landing. These precautions are necessary, because Point Pinos, with the whole bay, is frequently enveloped in a dense fog. Often the coasting steamers have to run for the beach, and then be guided by the rote to the anchorage. La Pérouse says he heard the rote when one league off shore.

The direct course from Point Año Nuevo to the anchorage is southeast half east (SE. ½ E.), and the distance thirty-six and a half miles. From Point Año Nuevo to Point Pinos the bearing is [illegible] degrees east (S. 50° E.), and the distance thirty-four and one-third miles. From the light at Monterey to that at Santa Cruz the distance is twenty-two and a quarter miles, and the bearing north thirty-one and a half degrees west (N. 31½° W.).

The geographical position of the end of the wharf abreast of the custom-house at Monterey is:

Latitude	36° 36′ 16″ north.
Longitude	121° 53′ 31″ west.
Civil time	8h 07m 34s

The Corrected Establishment, or mean interval between the time of the moon's transit and that of high water, is 8h 12m. The mean rise and fall of tides is three and four tenths feet; spring tides, four and three-tenths feet; and of neap tides two and one-half feet. The duration of the flood is 6h 31m; of the ebb, 6h 2m; and of the stand, 0h 35m. The average interval between the corrected establishment of the a. m. and p. m. tides of the same day is 1h 2m for high water, and 1h 2m for low water. The differences, when the moon's declination is greatest, are 1h 10m and 1h 28m, respectively. The average difference in height of these two tides is one and two tenths feet for the high waters, and two and four tenths feet for the low waters. When the moon's declination is greatest these differences are two and two-tenths feet and three and seven

tenths feet, respectively. The average difference of the higher high and lower low waters of the same day is five and three-tenths feet, and when the moon's declination is greatest, six and three-tenths feet. The higher high tide in the twenty-four hours occurs about 9h 36m after the moon's upper transit (southing), when the moon's declination is north, and about 2h 50m before, when south. The lower of the low waters occurs about seven hours after the higher high tide. The greatest observed difference between the low waters of one day was four and three-tenths feet, and the greatest difference between the higher high and lower low waters of one day was seven and nine-tenths feet.

To find the times of high and low waters, first compute the times for San Francisco, and from the numbers thus obtained subtract 1h 41m for Monterey; for the heights subtract two-tenths of a foot from those obtained for San Francisco.

The *town of Monterey* presents a very pretty appearance as seen from the water. Immediately behind it the country rises in plateaus, diversified by hill and valley, and beautifully dotted by oak groves. On the west of the town, in front of the pine forest, was situated the old Presidio of Monterey. The town was the capital of California while under the rule of Mexico and for some years after it became a State. In 1880 it had a population of 2,095 persons, but it is rapidly increasing.

Several whaling companies have their establishments at Monterey; their cruising ground is the bay of Monterey and a short distance to sea. During the season, which usually lasts nine months—from March to November—operations are carried on by means of boats furnished with bomb lances.*

Regular communication is kept up with all parts of the coast by steamers and numerous sailing vessels, and the railroad now gives direct connection with San Francisco and the interior.

The harbor of Monterey was discovered by Vizcaino in 1602, but his description misled the Missionary Expedition of 1769 because he designated it "a noble harbor, and secure against all winds."

Francisco Lopez de Gomara, in his history of the Indies, calls the whole bay the Bahia de los Pinos.

Admiral José Cabrera Bueno Gonzales, writing in 1734, says that the northeast side of Point Pinos forms a famous harbor, which may be entered steering straight in, and approaching the shore to the depth of six fathoms.

The shores of Monterey Bay, with landings, wharves, etc.—Following the shore from the town of Monterey northward it presents a uniform sand beach, running nearly north, backed by low, dreary sand dunes, producing sparsely the coarsest grasses and bushes, and entirely destitute of fresh water. Two miles to the northeast of the town, on the immediate beach, are seen the large bathing establishments of the Hotel del Monte. Continuing northward, this waste of sand dunes extends to the Salinas River, of which we reach the great bend at about nine and a half miles from Monterey, and only one hundred yards from the beach. From Point Pinos it bears northeast by north quarter north (NE. by N. ¼ N.), distant eight and a half miles. From this bend the river runs parallel with the line of the beach, just inside the low sand dunes, for a distance of four and a half miles, and there discharges. From Point Pinos the mouth bears north by east five-eighths east (N. by E. ⅝ E.), and is distant twelve and three quarters miles. There have been seasons when the river broke through the beach at the great bend† and there discharged the greater part of its waters into the bay. This river has been designated by a variety of [illegible] as Buenaventura, Monterey, and Salinas, but the latter is now the accepted name. It rises [illegible] the latitude of the Piedras Blancas, one branch about twenty and the other thirty-three miles from the coast. These branches meet at the town of San Miguel, about twenty-seven miles northwest (NNW.) from San Luis Obispo, and thence the stream runs parallel with the [illegible] and behind the Sierra Santa Lucia.

There are now several wharves and landings in Monterey Bay for the shipment of the productions of the adjacent valleys.

Moss Landing is the name of the wharf one mile south of the mouth of the Salinas, at the head of the submarine valley already described, and lies north six degrees east (N. 6° [illegible]

* [illegible] Natura. History of the Cetacea and other Marine Mammals of the Northwest [illegible] Ameri[illegible].

† See the Report of the Superintendent of the U. S. Coast Survey for 1854, Appendix No. 22.

‡ [illegible] of the Salinas and Monterey Bay, Don Josef Tobar y Tamariz he calls this [illegible] de San Antonio.

miles from Monterey wharf, and south sixty-five degrees east (S. 65° E.), fourteen and a half miles from Santa Cruz wharf. It is a high wharf, and the coasting steamers lie on the northeast side of it to discharge and receive freight. It stretches out to the northwest, and the depth of water at the end is very variable, ranging from ten to fifty feet, so that the outer end has several times fallen in. The inner end is built over the peninsula and across the Salinas River and a slough. A buoy lies in twenty-five fathoms off the wharf, to which vessels can haul out. There are heavy breakers to the northward and southward of this wharf, but none immediately near it, attributable, as at Point Hueneme, to the great depth of water at the head of the submarine valley immediately off here.

The town of Castroville, on the Southern Pacific Railroad, lies two and a half miles to the southeastward, and Watsonville and Pajaro, on the same railroad, eight miles to the northward.

The Salinas or Gibson's Landing.—This is a wharf on the right bank of the Salinas River, at its mouth, which is only sixty yards wide at low water. To reach it the bar of the Salinas must be crossed, upon which there is only about five feet at low water, generally with heavy breakers, and through a constantly shifting channel over the quicksands of this vicinity. The coasting steamers have not used this landing for several years.

From the mouth of the Salinas to the entrance to the *Rio del Pajaro*,* the distance is two and a quarter miles, the shore trending to the north-northwest. The entrance of this river bears north by east (N. by E.), distant fourteen miles, from Point Pinos.

From here the coast runs nearly straight to Aptos Creek, a distance of eight and a half miles, and about six miles to the eastward of Santa Cruz, with the shore rocky and abrupt.

North of the Salinas River begin rich meadow and table lands, affording to the settlers spots unsurpassed for productiveness, even in the prolific State of California. The towns in this vicinity had in 1880 the following population: Castroville, 503; Salinas, 2,600, and Watsonville, 1,800; but all of them are increasing rapidly.

Pajaro Landing.—One mile northwest from the mouth of the Pajaro, and south seventy-seven degrees east (S. 77° E.), eleven miles, from Santa Cruz wharf, is the wharf of the Pajaro landing. It is about two hundred yards long, stretches out at right angles to the beach, and has ten or seven feet of water at its extremity. The coasting steamers lie along the south side of it, head out, to discharge and receive freight. There are mooring-buoys outside the wharf. The towns of Watsonville and Pajaro are situated on the Southern Pacific Railroad five miles to the east-northeast from the landing. The wharf bears north four degrees west (N. 4° W.), sixteen miles, from the Monterey wharf.

White's Landing, half a mile, and *Mills' Landing*, two and a half miles northwestward of the Pajaro Landing, marked down on the earlier Coast Survey charts, were surf landings and had no wharves. They have not been used for many years.

Sanquel Cove.—This is the deeper indentation of the northernmost part of Monterey Bay, north sixteen degrees west (N. 16° W.), sixteen and a half miles, from Point Pinos Light, and four and a half miles east-northeast (ENE.) from Santa Cruz Light. It is not a cove in the usual acceptation of the term, but a rather broad bight, four miles wide and one and a half deep, with a uniform bottom of hard sand and shells, and having a depth from ten fathoms outside to [illegible] fathoms close to the line of breakers which border the cove from the mouth of Sanquel Creek [illegible] by the east.

Sanquel Point, which forms the western boundary of the cove, is a broad cliff, quite low at the [illegible] edge, and rising to a mesa of about forty feet elevation. It lies north seventy-one and a [illegible] degrees east (N. 71.5° E.), two and one third miles from Santa Cruz Light. A thick belt of [illegible] stretches out nearly one third of a mile from the point. Five fathoms of water can be carried [illegible] alongside the kelp, and in thick weather the coasting steamers follow it close aboard between [illegible] Cruz and the Sanquel landing.

The narrow valley of the *Aptos Creek* opens three and two-thirds miles, north fifty-nine degrees [illegible]9 E.), from Sanquel Point between banks that are one hundred feet high. *Sanquel* [illegible] another small stream emptying into the Sanquel bight, one and a half miles north thirty-

*Dalrymple's copy of the survey of Monterey Bay by Don Josef Tobar y Tamariz he calls this river the Rio [illegible]. It is called San Benito on the State map, and by other authorities the San Antonio. On the early Coast [illegible] was called Pigeon River.

[illegible] spellings have been given for Sanquel: Shoquel, Soquel, etc.

one degrees east (N. 31° E.) from Sauquel Point. The adjacent mesa lands are one hundred f above the water. The two landings in Sauquel Cove are at Aptos Creek and Sauquel Creek.

Upon the mesa land behind Sauquel Point, De Mofras (1841) places the Villa de Branciforte but no building was here when the country came into possession of the United States.

Aptos Landing.—The wharf at the mouth of the Aptos Creek is on the west point of t entrance. It is a high wharf, about two hundred yards long, stretching out at right angles to the beach, and has about ten feet of water at its extremity. Coasting steamers lie on the southeast side of it, and there are mooring-buoys off it to which vessels can haul out. From Sauquel Point it bears north fifty-eight degrees east (N. 58° E.), distant three and one-third miles.

Sauquel Landing.—Stretching out over the sandy point from the eastern part of the bluff on the western or right bank of the Sauquel Creek is the wharf of this landing, having a depth of nine feet at its extremity. It is one and a half miles north thirty degrees east (N. 30° E.) from Sauquel Point, and the thick body of kelp which extends from the eastern limit of Santa Cruz Harbor around Sauquel Point is here broken through, although but a short line is found to the eastward. The coasting steamers lie on either side of the wharf, either head or stern out, as there is not much swell reaching this beach. This is a good summer anchorage, and a great deal of produce is shipped from here. In winter the landing is reported to be worse than at Santa Cruz, and more difficult to get away from in southerly weather. Mooring-buoys lie outside the wharf.

SANTA CRUZ HARBOR.

This harbor or anchorage is at the northwest part of the bay of Monterey, and is of very limited extent. It is protected from all the winds from the northward, but exposed to the full sweep of southerly gales, and many coasters have been driven ashore during the winter seasons. It is about three quarters of a mile in depth northward, by one and a half miles east and west.

There is a broad plateau of moderate depth of water to the south and east of the harbor for five miles, deepening to thirty fathoms over hard sand. A depth of ten fathoms is found about a mile off the general curve of the shores. Directly south of the Light-house at Santa Cruz Point, the thirty-fathom line is three and a quarter miles distant, and the sandy bottom changes to green mud, sticky and hard. At eight and a half miles directly south, the depth has increased regularly to sixty-five fathoms and then suddenly drops off into the great submarine valley with no bottom at two hundred and twenty fathoms. (See description of submarine valley, page 142.)

*Santa Cruz Point,** the western point of the harbor, is a moderately low cliff with a point. It is quite flat, about forty feet above the sea, and it is marked by the Light-house and some other buildings. Behind these there is a grove of trees. When the point bears northeast by east (NE. by E.) two low, flat rocks show close under the point, and the outer and larger one seems nearly half as high as the bluff. There is no beach at the base of the cliff, but the three-fathom line extends about one-sixth of a mile, and is nearly marked by a dense body of kelp, which, however, southeast of the point, retreats well inside this line. The geographical position of the point is given under the description of the Light-house.

From Santa Cruz Point round to the east, as well as some distance to the westward, the seaward slope of the hill is well marked by two lines of terraces. The lower is the top of the shore bluff, about sixty or seventy feet above the sea, and the upper is probably two hundred and fifty or three hundred feet.

The eastern point of Santa Cruz Harbor is the western part of Sauquel Point, a cliff about forty feet high. Between the two points of the harbor is a beach five-eighths of a mile in extent, and at its eastern extremity, close under the bluff, empties the *San Lorenzo River*, a small stream running past the town and mission, which is situated a mile inland. Behind this beach are numerous large buildings and bathing houses.

Landing is effected at either of the two wharves, which run out about three hundred yards from the northwestern bight of the harbor. These wharves have been damaged at times by heavy southerly weather; a third one has been destroyed, and a few piles of it yet remain (December, 1884).

At the end of the southern wharf there is ten feet of water. It is built out from the foot of the bluff and slopes down to the extremity. This wharf is used mainly by schooners loading lumber for San Francisco and other ports on the coast. The northern or railroad wharf is very short

* This point was erroneously called Punta Año Nuevo by Vancouver, November, 1792, and he erroneously places two rocky islets off it. (Latitude 37° .)

tially built. It widens out near the outer end and the tracks are laid clear to the extremity. It runs out on a level three hundred yards in a southeast by south direction from the east side of the small creek emptying west of the San Lorenzo River. It has ten feet of water at the extremity. The steamers use this wharf. There are heavy wooden mooring-buoys off both wharves, and vessels lie head out to receive and discharge freight. They must haul out if a swell or bad weather comes up. The coasting steamers lie about five hundred yards off the wharf at low tide, or when there is too much swell to lie alongside of it. From this wharf to the wharf at Monterey the distance is twenty-two and a quarter miles and the course south thirty-one and a half degrees east (S. E.).

Vessels coming from the northward, after leaving Point Año Nuevo, follow the coast-line on a general course east-southeast (ESE.) for about eighteen miles. The shore for this distance is sharp, jagged, and moderately elevated, with a range of high hills or mountains whose summits in summer are almost constantly enveloped in fog. Skirting the shore at a distance of half a mile a depth of six to ten fathoms can be carried, and upon making Point Santa Cruz, the top of which is moderately level for some distance back, four fathoms are obtained within a quarter of a mile of it. For about a mile west of the light a belt of kelp borders the shore, and will serve as a mark in thick fog, but at its eastern limit there is sixteen and eighteen feet outside of it. When abreast the Light house point, round up and run along in six fathoms of water until nearly abreast of the point at the western limit of the beach, where good anchorage will be found nearly half a mile from the shore, with the Light bearing south fifty degrees west (S. 50° W.) three-quarters of a mile distant, and the point of bluff on the east side of the river bearing north fourteen degrees west (N. 14° W.) nearly half a mile off. The smaller steam-vessels usually skirt the coast within half a mile and go between the large field of kelp and the kelp off the point, because the reef stretching from Light house Point is well marked by the breakers and rollers.

There is five and a half fathoms of water at this anchorage with fair holding bottom; inside of it the bottom is sandy and the swell short and heavy. During the winter months anchor well outside to be able to clear the shore westward of the Light-house Point in case a southeaster springs up.

The high mountain north twenty-five degrees east (N. 25° E.), twelve and a half miles from Santa Cruz Light-house, is named *Mount Bache*, and is thirty-seven hundred and ninety-one feet high. It is sometimes known as Monte Prieto or Loma Prieta; it is a good landfall.

SANTA CRUZ HARBOR LIGHT-HOUSE.

This Light-house is situated at the southwestern point of the harbor and two hundred yards south of the extremity of the perpendicular cliff, which is thirty-three feet above the sea. The [illegible] consists of a keeper's dwelling of wood, painted white with green blinds to the windows [illegible] and a half stories in height with a small, low, square, wooden tower, painted white, rising [illegible] western end of the dwelling, and surmounted by an iron lantern painted white, with red [illegible]. The height above the ground is thirty-five feet. There has grown a large grove of pine or [illegible] trees for nearly half a mile westward and northward of the Light house, and the white house [illegible] ted against the eastern edge of the grove where it bears about north-northeast.

The Light is a *fixed red light* of the fifth order of the system of Fresnel; was first exhibited [illegible] 1, 1870, and shows every night from sunset to sunrise. It illuminates an arc of the horizon [illegible] o hundred and seventy degrees, and can be seen from west three-quarters south (W. ¾ S.) [illegible] the south into the harbor of Santa Cruz, except when too close under it. The focal plane [illegible] is sixty-nine feet above the mean level of the sea, and in a favorable state of the atmosphere light should be seen at a distance of eight and a half miles. Vessels from the northwestward [illegible] not see this light until it bears east three-quarters north (E. ¾ N.). The geographical [illegible] of the light, as determined by the Coast and Geodetic Survey, is:

Latitude	36° 57′ 05″ north.
Longitude	122° 01′ 38.3″ west.
Or, in time	8h 08m 06s.5.

The buildings have been moved back from the cliffs which were being undermined by three large [illegible] made by the action of the waves.

The magnetic variation, January 1, 1885, was 16° 15′ east, with an annual increase of 0′.8.

From the Light we have the following bearings and distances to prominent points:

Point Pinos Light-house	S. 29½° E.,	distant 19½ miles.
Moss Landing	S. 67½ E.,	distant 14½ miles.
Pajaro Landing	S. 79° E.,	distant 11 miles.
Samquel Point	N. 71½ E.,	distant 2½ miles.
Monterey Anchorage	S. 34° E.,	distant 21½ miles.

Santa Cruz Harbor, Whistling Buoy.—An *automatic whistling buoy* painted with *black and white perpendicular stripes*, has been moored in the approach to Santa Cruz Harbor, nearly equi-distant from Point Santa Cruz and Samquel Point. It lies in ten fathoms of water over a bottom of hard, coarse, gray sand.

It is located by the following bearings and distances:

Santa Cruz Light-house	W. by N. ½ N.	1¾ miles.
Pacific Coast Steamship Company's wharf	N. W. ½ W.	1½ miles.
Samquel Point	NE.	1¾ miles.

It is sounded by the action of the sea, and gives blasts of two to thirty every minute. It was placed in August, 1888.

The secondary astronomical station of the Coast Survey (1852) was on the top of the bluff at the old embarcadero, near the head of the western wharf.

Tides.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is X^h 18^m. The mean rise and fall of tides is four and one-tenth feet; of spring tides, five and one-half feet; and of neap tides, two and nine-tenths feet. The mean duration of the flood is 6^h 47^m; of the ebb, 5^h 45^m; and of the stand, 0^h 20^m. The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1^h 44^m for high water, and 1^h 2^m for low water. The differences, when the moon's declination is greatest, are 2^h 40^m and 1^h 28^m, respectively. The average difference in height of these two tides is one and four-tenths feet for the high waters, and two and four-tenths feet for the low waters. When the moon's declination is greatest these differences are two and two-tenths feet and three and seven tenths feet, respectively. The average difference of the higher high and lower low waters of the same day is six feet, and when the moon's declination is greatest, seven feet. The higher high tide in the twenty-four hours occurs about 9^h 32^m after the moon's upper transit (southing), when the moon's declination is north, and about 2^h 54^m before, when south. The lower of the low waters occurs about 7^h after the higher high tide.

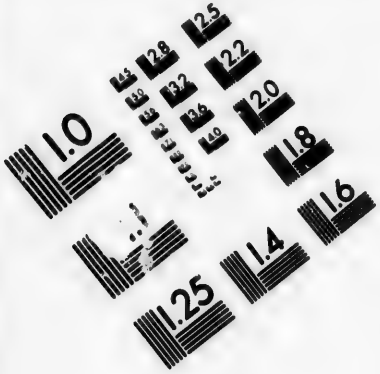
To find the time and height of high water at Santa Cruz for any given day, take out of the Coast and Geodetic Survey tide-tables the time for San Francisco, and subtract 1^h 38^m from; and add three-tenths of a foot to the San Francisco height. For low water, subtract 2^h 05^m from the time, and two-tenths of a foot from the height as given for San Francisco.

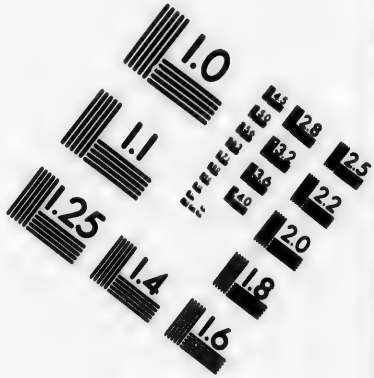
The country about Santa Cruz is exceedingly productive and thickly settled; in 1886 the population of the town was 3,898 persons, and is very rapidly increasing.

Steamers run regularly from San Francisco to this place and connect with all the [illegible] adjacent, whilst sailing vessels find abundant freight therefrom. There is also communication with San Francisco by two lines of railroad, and telegraph connection with all parts of the country. It is a fashionable sea-bathing resort.

From Monterey Bay stretches the fertile valley of the Salinas for sixty miles to the southeast, and the valley of the Pajaro River and its tributaries to the eastward and northward of the Gavilan Mountains. These mountains, lying eastward of the bay, are high and bold, forming notable landmarks, but are quite distant.

In 1602 the bay of Monterey was discovered and surveyed by Sebastian Vizcaino, who named the anchorage Puerto de Monte-rey, in honor of the Spanish viceroy of Mexico, Don [illegible] Zuniga, Count de Monte-rey, who dispatched the expedition under orders of Philip III [illegible] ering and making settlements in proper parts of California. He designates it as a [illegible] affording protection from all winds. In 1769, Gaspar Portala's expedition determined "[illegible] extremity (Sierra de Santa Lucia) in this harbor and Point of Pines 36° 16'." After [illegible] from the Sierra the expedition "caught sight of Point of Pines and the harbors on its [illegible] south sides without discovering any indications of landmarks of the bay of Mo[illegible]" as described by Vizcaino. Carmel Bay, under Point Cypress, was called the "Harbor of Pines." It was used by the Spanish galleons on their return from Manila to Mexico. Juan Perez, in 1774, calls the harbor of Monterey, San Carlos de Monterey. He had Father Junipero Serra on his vessel. The Bay of San Francisco was first entered by a vessel from Monterey.





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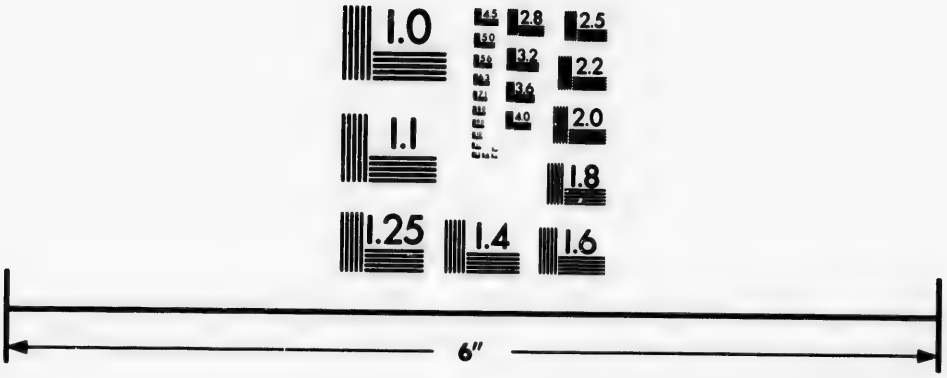

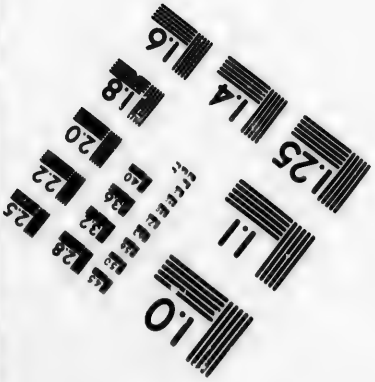

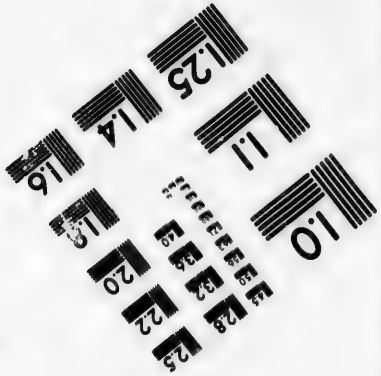

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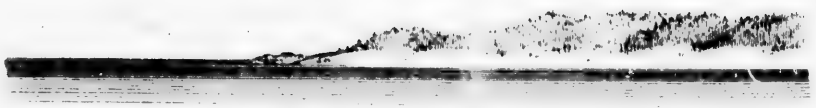
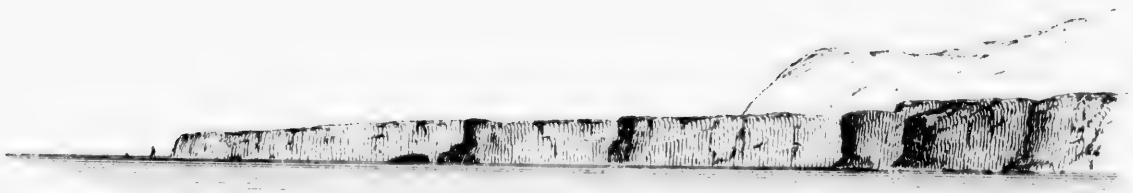


Monterey Bay. Point Pinos Light-house, N. ¼ E., 5 miles.

Mount Carmel, 4,417 feet. Point Sur (head not visible), SE. ¼ E., 36 miles.
Point Pinos (white sand dunes), E.SE., 21 miles.



Sail or Needle Rock (4 miles westward of Santa Cruz), W. by N., 2¼ miles.

Point El Jarro,
E. by S. ¼ S., 4 miles.

Sand Bluff Point, 8¼ miles.

Point El Jarro, NW. by W., 7 miles.

Sand Bluff Point.

Point Año Nuevo (Islet),
NW. by W., 6 miles.

Big gulch.

A preliminary chart of Monterey Bay was published by the Coast Survey in 1857; and the bay with coast line to Bodega was published in 1862, with several subsequent editions.

From Point Santa Cruz to Point Año Nuevo the distance is eighteen and a half miles following the shore line, which at first runs nearly west-southwest for three miles, curving then to the northward for another three miles, whence the direction is northwest by west three-quarters west (NW. by W. ¾ W.) to the rocky islet off Point Año Nuevo. The kelp does not border the coast-line for five miles northwestward of Santa Cruz, but at that distance it skirts the shore to within three miles of Point Año Nuevo. The line of mountains lying between the San Lorenzo River and the coast is flanked by a cliff-faced terraced table-land for twelve miles to just north of Point Ledarro, but the ridge itself is high and unbroken until near the latitude of Point Año Nuevo, when a very noticeable gap occurs. Vessels in running northward report that when about four miles off shore, and nearly up with the Point, the gap is abeam, and can be distinguished when the lower part of the shore is obscured by low fog or haze. It is doubtless the valley of the Arroyo Año Nuevo, which opens on the coast three miles east of Point Año Nuevo after breaking through the hills to the northward. When Pigeon Point Light bears north half west (N. ½ W.) distant seven miles, the gap shows to the northeast one-quarter north (NE. ¼ N.), with black hill-tops to the northward.

Details along the coast westward of Santa Cruz Light.—On the mesa overlooking the cliffs, one mile west by south from the Light-house, there is a very large two-story building, with five windows to each story, at the race course, with some detached trees. When a vessel is just east of this house the town of Santa Cruz is seen to the north and northeast, over the mesa, clustering at the foot of the hills.

There is a double-arched rock close under the cliffs at the slightly projecting point one and a half miles westward of the Light-house, or half a mile westward of the race-course house.

Terrace Point.—This is the southernmost part of the coast-line, two miles south sixty eight degrees west (S. 68° W.) from the Santa Cruz Light-house. When a vessel is close off this point, looking to the westward, Needle or Sail Rock shows clear of the farther cliffs distant only two and a quarter miles. Some of the steamer captains know this point as Pillar Rock Point, because there is a pillar about as high as the cliffs close under them. A cave in the cliffs is noticed about two hundred yards to the eastward.

One and one-eighth miles westward of Terrace Point and a mile eastward of Needle Rock Point there is a natural bridge at the cliff shore. It is the western of three apparent caves, but this one perforates the mesa, and the land beyond is seen through it. It is open clear at the northwest and a boat could go through at a smooth time.

Needle Rock or Sail Rock Point.—This is a very slender pinnacle separated from the face of the cliff, and not distinguishable from it when abreast of it. It is the north part of a table-rock, but the apex is not so high as the cliff. There is a second and lower one standing nearly two hundred yards to the southward of it.

Behind this point to the north-northwest the land rises from the shore in four very marked terraces. This point lies south seventy-eight degrees west (S. 78° W.) three and four-fifths miles from Santa Cruz Light-house, but they are not intervisible on account of the rounding intervening shore.

Needle Rock can be seen from Sand Hill Bluff, which is two and two-thirds miles to the west by north one-quarter north (W. by N. ¼ N.). It is locally known to the steamer captains as Sail Rock.

Table Rock is a mile and two-thirds to the west by north one-quarter north (W. by N. ¼ N.) from Needle Rock Point, and one mile from Sand Hill Bluff. Close under the cliffs there is a large flat rock with two shelvings, of which the higher is twenty feet above the water, but the swell goes clean over it. There is deep water close off it, and kelp outside hence to Sand Hill Bluff and beyond. There is a depth of ten fathoms within a third of a mile of the shore, and five and six fathoms at the outer edge of the kelp. There is a big cave in the cliff about half a mile to the east by south of the rock.

Sand Hill Bluff.—This is that part of the long, rounding shore that is first seen after passing Point Año Nuevo when coming from the northwestward, and the top of the cliff is the lowest of three well-marked terraces showing along this line of the coast. The sandstone cliffs rise about fifty feet above the sea, and are of nearly uniform height; but on the top of this slightly projecting cliff there is a rounding hillock of white sand. The hillock is white on the northwest side and green

to the southeast. It is a well-recognized landmark for the coasting steamers and schooners. The southern face of this point is one-third of a mile long, east and west, and the western face is one-half of a mile long. On the east side the cliffs fall back a few hundred yards to the north. On either side of it there is a deep gorge that breaks through the terraced land. One gorge is a third of a mile to the northwest, and the mouth of the *Laguna*, where the land is low, and the stream debouches through a broad and steep sand-beach. The other gorge is over half a mile to the eastward, and is known as *Eagle Glen Gulch*, which opens upon the shore of the slight bight between Table Rock and Sand Hill Bluff. This gulch shows almost vertical columnar-shaped cliffs half a mile inside. It is filled with timber and seems to cut the terraced coast ridge clear through to the crest line. There are farm houses near the mouth, which is marked by a short sand beach.

The straggling kelp line lies very close under the cliffs of the point, and the deep water comes close to their base. The five-fathom curve lies only one hundred and seventy yards off shore, and a depth of eight fathoms of water is found only a quarter of a mile from shore. The geographical position of the point is, latitude 36° 58′ 30″ north and longitude 122° 09′ 15″ west.

From this point the bearing of Point Año Nuevo fog whistle is north sixty-three degrees west (N. 63° W.) and the distance twelve miles. This course passes tangent to the point at Williams Landing, distant two miles to the west-northwest; and just inside Point El Jarro at four and a half miles. Following the shore to the Santa Cruz Light house the distance is six and a half miles. To Point Pinos Light the bearing is south forty-two degrees east (S. 42° E.), and the distance twenty-three and a quarter miles.

When three-quarters of a mile off Sand Hill Bluff the Needle (or Sail) Rock and its smaller companion stand out clear of the cliffs.

The Needle or Sail Rock, Table Rock, and Sand Hill Bluff are very nearly on the same bearing, north seventy-six degrees west (N. 76° W.).

Kelp.—There is a gap in the kelp field for over a mile to the westward of Sand Hill Bluff, and then it continues, but not compactly, close under the cliffs for nine miles to Big Gulch at the eastern part of Año Nuevo Bay.

On the coast, one and a third miles west-northwest (WNW.) from Sand Hill Bluff, are the readily recognized houses of the Sidebank Dairy. Here the Arroyo San Vicente opens on the beach three-quarters of a mile from Williams Landing and three and a half miles from Point El Jarro.

Williams Landing.—About nine miles from Santa Cruz, following the coast, or half way to Point Año Nuevo, there is marked on the chart Williams Landing and Wilhams Chute. There was formerly a landing here, and afterwards a flying chute was thrown out from the bluff and a cage hauled out on a wire cable. The vessels anchored under it with their sterns nearly in the breakers. It has been abandoned since 1869. The south point of the creek is a bold, high cliff, estimated to be seventy feet above the water.

El Jarro Point.—Following the regularly curving coast-line northwestward from Santa Cruz Light for eleven and two-thirds miles is the low, bluff point of El Jarro, with broad, low table-land on either side. The point has only a very slight projection beyond the general curve of the coast line. It is within one mile of the northern limit of the well-marked table-land hither from Santa Cruz. From Point Año Nuevo fog-whistle, it lies south sixty-three degrees east (S. 63° E.), distant seven and a half miles.

Breakers stretch out one-quarter of a mile from the point when a large swell is running, and kelp lies out to five fathoms, about one-third of a mile from shore. The thirty-fathom line of soundings, over fine green sand and mud, is only one and three-quarters miles from shore, with regular bottom; but the one-hundred-fathom line is seven miles from shore, over coarse black and gray sand and mud. Thence the decline of the bottom is very great to one thousand fathoms at about thirty miles. Northward of El Jarro, the one-hundred-fathom line stretches well out to the westward, being fourteen miles off Pigeon Point.

The Arroyo del Jarro, or Scott's Creek, opens on the beach a mile and a half to the northwestward of the point.

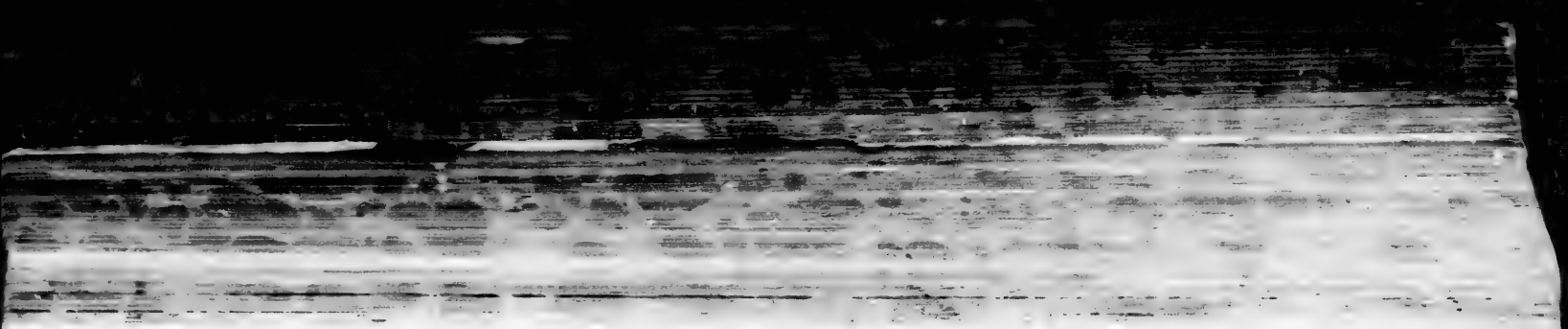
There is a slight indentation in the shore-line to the eastward of the point where a wharf has been built out for the shipment of produce. This is called Davenport's Landing, for description of which see below.

From Point El Jarro we have the following bearings and distances to prominent points:

Point Pinos Light-house	S. 47° E., distant 27 miles.
Point Año Nuevo fog-whistle	N. 63° W., distant 7½ miles.

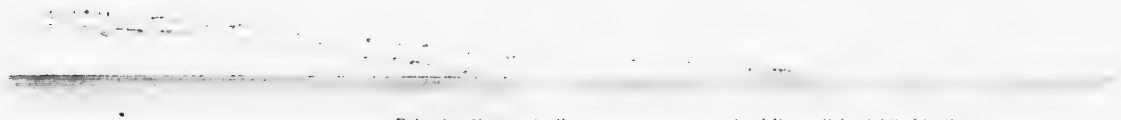
Needle Point, East 13¼ miles.
Mount Carmel, 4,417 feet, 39 miles.

Sand Bluff Point, 4½ miles.
Sail Rock, or Needle Rock, E. by S., 7 miles.



Point Año Nuevo Fog-whistle, NE. ¼ E., 4 miles.

Año Nuevo, SE. by E., 4¼ miles.



Point Año Nuevo, 4 miles.

Sand Point, E. by S. ½ S., 16 miles.

The distance to Santa Cruz Light, following the coast in ten fathoms, is eleven and one-quarter miles.

Davenport's Landing.—This landing is located at the mouth of a gulch in the very small bight three quarters of a mile to the eastward of Point El Jarro. It is quite exposed and a very uncomfortable resort with either summer or winter winds. There are numerous rocks in the anchorage, which has little water. The old wharf was abandoned and a new and costly one built to replace it; this was swept away in the first gale, but has since been re-erected. Only small steamers and schooners load here; moorings are laid outside for them to haul out to.

In December, 1884, there were two wharves at the mouth of the gulch, where the white cliffs both north and south of it are about seventy feet high. The old wharf is on the south side, the new wharf at the north side of the gulch. It is used occasionally. There was a great break outside the landing and across the whole front. The cliffs in this vicinity are of uniform height, and broken here and there with gulches.

The three terraces on the mountain front are particularly plain here. Above the second terrace are two well-marked triangular areas on the slope of the hills.

Two miles south of Davenport's Landing, there are several gulches, with two white houses on the top of the cliffs and on the north side of the principal arroyo.

From Point El Jarro to Point Año Nuevo the coast line retreats a mile and a half eastward of the latter point. About one and a half miles northwestward of Point El Jarro a broad, wooded gulch comes in from the north; this is the stream named the Arroyo del Jarro or Scott's Creek. It has quite a long sand beach at its mouth, and at the southeast end of this beach the sand is drifted into a dune fully as high as the cliff line of the point. The character of the cliff changes northwestward of this stream from the well-marked mesa-land to irregular rolling ridges and intervening gulches. The coast foot-hills crowd nearer the shore line until at the Arroyo Año Nuevo they are immediately upon it. The adjacent hills to the southward are rolling and grassy, but those to the northward are broken and in places covered with timber.

The kelp skirts the shore out to a depth of six fathoms to the mouth of the Arroyo Año Nuevo, three miles from Point Año Nuevo.

In working close under the coast-line in thick weather, small vessels locate themselves by a bridge across the Arroyo del Jarro with a house near it, six and a half miles southeast from Point Año Nuevo fog-whistle.

POINT AÑO NUEVO.

This point lies eighteen and a half miles from Point Santa Cruz, and is formed by rolling hills of shifting sand, varying from twenty to one hundred feet in elevation, while behind them rises the Santa Cruz range of mountains, attaining a height of fifteen hundred feet in four or five miles.

A quarter of a mile outside the point lies a black, jagged islet, about thirty feet high, consisting of a sloping ledge of rocks covered with a stratum of yellow clay, about four feet thick, and this again covered with sand (1853). But in 1869–70–71 the covering of sand did not exist and very slight signs remained of the patches of clay. This rocky ledge is one of the most dangerous on the coast in its relation to the large amount of coast trade. In thick weather a vessel coming from the westward is close upon it before seeing it, the more especially as the land to the eastward retreats one and a half miles, is quite low, and frequently can not be made out. The islet sends off a ledge for half a mile to the east-southeast (ESE.) that serves to break the swell before reaching the cove, but increasing the danger to vessels approaching from the southeastward around to southwest.

Breakers are reported off the islet; the first lies about one quarter of a mile south southwest (SSW.) from it, and the second about one-third of a mile south. With a large swell these breakers are very heavy.

A depth of five fathoms of water is found just outside the islet, and the ten-fathom line is less than two thirds of a mile from the point itself, and about one-third of a mile outside the fog-whistle. At two miles, the depth of water is thirty fathoms over green sand and mud; at four and a half miles, it is fifty fathoms over green mud; at eleven miles, it is one hundred fathoms over fine green sand; thence the slope to the one-thousand-fathom line is sharp.

Hidden Danger.—In the approaches from the northwest a large body of kelp stretches northwest by west (NW. by W.) one and one third miles from the islet; and inside this field, one mile northwest one quarter west (NW. ¼ W.) from the fog whistle and half a mile from shore, is a rock with seventeen feet of water. The three fathom curve lies about half-way between this rock and the shore.

A rock with nine feet of water upon it is mentioned in the following description:

Point Año Nuevo Anchorage.—This is a summer anchorage formed by the curving of the shore to the northeast from Año Nuevo islet for a mile and a third, then to the southeast by east for two miles to Big Gulch. The indentation of the shore is about one mile deep to the north, and the bay thus formed is moderately well protected from the northwest swell, which is partly broken by a three-fathom reef and body of kelp stretching half a mile east-southeast (ESE.) from the islet. A nine-foot rock lies in this kelp field, near its southern extremity, and several other patches with less than three fathoms of water are found in it. With a stiff northwester blowing, and a large swell, this reef breaks heavily, but even then there is a good lee at the anchorage.

Two and three-quarters miles directly east from Año Nuevo Islet is the mouth of the Arroyo del Año Nuevo, or Big Gulch, and the deepest indentation of the cove lies three-quarters of a mile north of this line. Along the north shore of the anchorage lie several rocks close under the sand-covered bluffs. The largest and highest of these rocks has a notable perforation running about east and west. At the eastern part of the bay, and at the north end of the bright cliffs, there are two white houses on the grassy bluff, which is forty feet high.

The best place for anchoring is in eight fathoms when the middle of the islet bears west by south (W. by S.) distant seven eighths of a mile, and Point New Year wharf north, distant half a mile. In this position the eastern extremity of the three-fathom ledge running out from the islet bears southwest (SW.) distant half a mile.

The *Año Nuevo Creek* flows through a narrow valley with steep hillsides covered in places with timber. It is sometimes known as Big Gulch. There is a marked sand ridge at the mouth of this stream, higher at the southern extremity, and about half a mile in length. Down the west side of the arroyo a wooden tramway was laid for carrying redwood lumber. After reaching its mouth it was continued along the face of the high yellowish bluff, with the grade rising towards the north end, and then for two miles westwardly to the eastern point of the rocky ledge in the northwest part of the bay; but this has been destroyed, and in December, 1884, the line only along the face of the bluff was visible, and part of the trestle-work washed down to the base of the bluff. The bold coast ridge rises directly from the steep cliffs described to an estimated height of one thousand feet.

The *Point New Year Wharf* is built out about three hundred yards to three fathoms of water, where coasters can discharge and load. The end of the wharf lies one mile northeast (NE.) from the eastern end of the islet. Mooring buoys are laid off the wharf. It is reported that the winter southeast gales cut away the sandy beach and shoal the anchorage so that only the lightest vessels can load; but the summer winds and currents again deepen it. The wharf was sometimes known as Waddell's Landing. In 1883 we found the wharf washed away.

FOG-WHISTLE AT POINT AÑO NUEVO.

A twelve-inch steam fog whistle (in duplicate) has been established on the southwesterly seaward side of the rocky islet off this point, and has been in operation during thick and foggy weather, day and night, since the 29th May, 1872. It is sounded every sixty-five seconds. The duration of the *blast* is *ten seconds*, and the *interval* between blasts is *fifty five seconds*. The keeper's dwelling is one and a half stories high, built of wood, and painted light buff, with brown roof. It stands east by north from the fog-signal house, which is also painted light buff with brown roof. This fog-signal must not be mistaken for the steam whistle at Pigeon Point, only five and a quarter miles north forty-seven degrees west (N. 47° W.), and which has blasts of four seconds separated by alternate intervals of seven and of forty-five seconds. Vessels from the southward lay their course for the Año Nuevo fog-whistle; and they take their departure from it when going southward.

The geographical position of Point Año Nuevo fog-whistle, as determined by the Coast and Geodetic Survey, is:

Latitude	37°	06′	22″.5	north.
Longitude	122°	20′	11″.5	west.
Or, in time	8h	09m	20s.8	

The magnetic variation for January 1, 1885, was 16° 18′ east, and increases 0′.7 annually.

From the fog-whistle we have the following bearings and distances to important points:

Sand Hill Bluff	S. 63° E., distant 11¼ miles.
Point El Jarro	S. 63° E., distant 7¼ miles.
Point Pinos Light	S. 50° E., distant 44 miles.
Pigeon Point Light	N. 47° W., distant 5¼ miles.

To Santa Cruz Light, following the shore in ten to twelve fathoms of water, the distance is eighteen and two-thirds miles.

The distance to the bar of San Francisco Bay is forty miles.

The U. S. Coast and Geodetic Survey published a chart of Point Año Nuevo Anchorage in 1851; and its general features and relation to the coast are shown on the coast chart from Point Pinos to Bodega Head.

A study of Cabrillo's narrative clearly indicates that Cabrillo's Cabo de Nieve (Snowy Cape) was the great mountain mass pressing oceanwards in this vicinity from the backbone of the peninsula of San Francisco. He was a good distance from the coast and passed it when the mountains were covered with snow. (See description of Snowy Cape below.)

On the chart of Vizcaíno the point is named Punta Año Nuevo.

Point Año Nuevo is mentioned by Admiral José Cabrera Bueno Gonzales in 1734, and described as "a point of low land in latitude 37½ degrees, whence the coast runs more to the eastward, making a large gulf until you come to a low point of land thickly wooded to the sea, and to which the name of Point Pinos has been given."

In 1769, Don Miguel Constanzó, the engineer of Father Junipero Serra's Expedition, determined the latitude "at Point Año Nuevo, which has a low reef of rocks, 37° 04′."

Steamers coming upon the coast from the southward in thick weather always endeavor to make the land to the southward of Point Año Nuevo, and then follow the coast to the San Francisco bar.

Many of the coasting steamers report their compasses affected when close in with the coast between Point Santa Cruz and Point Año Nuevo. Although the vessel may be principally affected in this locality by undetermined ocean currents, influenced by the great submarine valley of Monterey Bay, yet geologists report that an extensive bed of magnetic iron occurs in this section running down to the coast where it crops out and exhibits a depth of several feet.

The most notable current mentioned off Point Año Nuevo is by the Coast Survey schooner *Ewing* on the 27th May, 1856, when she found a set of sixteen miles to the southward in sixteen hours; weather hazy, light variable breezes, and calm. Positions satisfactorily determined by observation and cross-bearings.

The *off shore soundings* from Monterey Bay to the Farallones show that the depth of one hundred fathoms is found between eight and nine miles from the shore, and continues at this distance until nearly up with Point Año Nuevo, where it suddenly increases to fourteen miles distant and thence runs northwest on a line lying five miles outside the Farallones. The deepest sounding was obtained only eight miles from shore and twelve miles southwest three-eighths west (SW. ⅜ W.) from Point Santa Cruz, and fifteen miles southeast by south one-eighth south (SE. by S. ⅛ S.) from Point Año Nuevo. The depth was three hundred and thirty-five fathoms over a bottom of coarse black sand and mud, and only one mile outside the one hundred-fathom line. In another series of soundings, the one thousand fathom line was placed only thirty-one miles off the coast, and the two thousand-fathom line seventy-five miles off, with green ooze bottom; the temperature at these great depths was nearly 32° Fahrenheit.

Snowy Cape.—There is no such point known to-day to our navigators, but when the early Spanish navigators were on their voyages of discovery they frequently noted bold prominent landfalls visible from a good distance seaward, and gave them names from the Church Calendar or some special feature. Snowy Cape is one of these landmarks. It is formed by a great flanking spur of the San Francisco Peninsula mountains pressing towards the ocean. It may be said to commence at the north side of Big Gulch, and runs with increasing height to the northwestward. Higher and above all the shore-line, which may be hidden in haze or mist, the great rocky ridge presses towards Middle Point, and its exposed rocky patches, white under certain light, may well have deceived Cabrillo into naming it. But it is very probable that it was covered with snow when he first saw it, as he was running southward before a heavy sea on the 18th of November, 1542. He was seeking for a port when he "discovered some very lofty mountains which rise to the sky, and the sea beat upon them. They were covered with snow to the summit, and were named Las Sierras Nevadas, and the principal one forms a cape which projects into the sea, which they named *Cabo de Nieve* (Snowy Cape). The coast runs north northwest and south-southeast. This Cabo de Nieve is in thirty and eight degrees and two-thirds of a degree."

As all his latitudes were too great, ranging from fifty minutes at the southward to more than one degree and a half at the northward, we may well assume that his latitude of this great lateral spur of the Peninsula Mountains is about 37° 08′.

Ferrelo did not see the cape on his next voyage northward, nor on his final voyage southward.

PIGEON POINT.

Thirty-nine and a half miles north fifty degrees west (N. 50° W.) from Point Pinos Light is Pigeon Point, with a light of the first order. It is a comparatively low, rocky point, rising abruptly about fifty feet above the sea, with a low neck of half that elevation immediately inside the Light, and thence gradually rising into grassy hills. Behind it rise the ridges and mountains of the Peninsula of San Francisco, marked by forests. From Point Año Nuevo Islet it bears north forty-seven degrees west (N. 47° W.), distant five and a quarter miles. Off the point lie three or four moderately large detached rocks stretching out three hundred and fifty yards south sixty-five degrees west (S. 65° W.) from the Light-house. Inside the point to the eastward, and about one hundred and fifty yards northeast of the Light, is a small contracted boat landing, available only in good weather. There is a whaling station here, and several large store houses have been built on the bluff above this landing, and a chute, with long outstretching booms and tackle, has been constructed by which small coasting vessels are loaded.* But all freight for this place is delivered in surf boats and carried on shore on sailors' backs. There is anchorage under Pigeon Point, and it is reported as somewhat better than the average of these exposed places; but it is broad open to the south, and there is very little protection from the summer winds and swells.

Point Bolsa lies exactly one mile northwest from Pigeon Point, but the light on the latter is seen over it for one-quarter of a mile inland.

The shore-line from Point Año Nuevo to Pigeon Point is rocky, not high, and retreats slightly eastward in two bights, with sandy beaches, divided by a low, jutting point called Middle Point. This is a very inconspicuous point from seaward. It is low, with sand-dunes just inside. Upon this stretch of the coast the westerly swell breaks very heavily. Behind the shore the land rises gradually to the first ridge, which has no trees upon it; then the inclination is greater to the mountains, which are black with chaparral and have large redwood trees in the gulches. Near Point Año Nuevo the first grassy ridge disappears, and there is a broad mesa land back from the beach, rising sharply to the mountains. A few farm houses are seen on this mesa.

A line of soundings of fifteen fathoms can be carried from half a mile off Point Año Nuevo to the same distance off Pigeon Point. There is no kelp off this shore except for one mile west-northwest (WNW.) from Point Año Nuevo, already described; none off Pigeon Point nor the coast to the northward. The one-hundred fathom curve is thirteen and a half miles off shore, with bottom of fine, dark-green sand; the thirty-fathom curve lies two miles off the point, with bottom of green mud; the twenty-fathom curve is one mile distant over fine green sand, whilst seven and eight fathoms are found close off the outlying rocks, upon which the swell breaks very heavily.

Pigeon Point was named from the wreck at this place of the clipper ship *Carrier Pigeon*.

LIGHT-HOUSE AT PIGEON POINT.

This Light-house is situated about ninety yards from the southwest extremity of the point. The tower is the frustum of a cone one hundred feet in height from base to focal plane, built of brick, and painted white with the dome of the lantern red. The railing, brackets of the gallery, and other iron work at the top of the tower are painted black. The keeper's dwelling is a large two-story house, built of wood, and painted light buff with a red roof. It is placed to the southwestward of the tower and has the usual out-buildings.

The light is a *flashing white light* of the first order of the system of Fresnel. It was first exhibited on the 15th November, 1872, and shows *flashes every ten seconds* with total eclipses between, every night from sunset to sunrise. The *flash* is four seconds in duration and the eclipse six seconds. The limits of the arc of visibility are from Pillar Point, north thirty-two degrees west (N. 32° W.) distant twenty miles, round by the west and south to Point Año Nuevo Islet, south forty-seven degrees east (S. 47° E.) distant five and a quarter miles; but it can be seen over Point

*This chute, called the Coburn Chute, located just inside the protecting rock upon which is built the Point Light-house, stood for twenty years, but it was blown away by the force of the southeast gale of November 17, 1885.

Pigeon Point Light-house, E.SE., 2 miles.

Point Año Nuevo Fog-whistle, SE. ¾ E., 7 miles.

Pigeon Point Light-house, NW., 6 miles.

Año Nuevo as far as Point El Jarro, bearing south fifty-six degrees east (S. 56° E.) twelve and three-quarters miles from Pigeon Point, and south sixty three degrees east (S. 63° E.) seven and one-half miles from Point Año Nuevo Islet.

It is to be noted that the coast between Pigeon Point and Pillar Point recedes to the eastward of the line joining them about two and a half miles, forming a long bight in which Pigeon Point Light can not be seen.

The focal plane of the lens is one hundred and fifty feet above the mean level of the sea, and the Light should be seen in a favorable state of the weather from a height of—

10 feet, at a distance of 17.7 miles.
20 feet, at a distance of 19.2 miles.
30 feet, at a distance of 20.3 miles.
60 feet, at a distance of 22.9 miles.

The geographical position of the Light, as determined by the Coast and Geodetic Survey, is:

Latitude	37	10′	48 .8 north.
Longitude	122	22	38 .9 west.
Or, in time	8h	09m	30s.6

The magnetic variation was 16° 20′ East January 1, 1885, with a yearly increase of 0′.5.

From the Light the bearings and distances to prominent points are as follows:

Point Sur, proposed light	S. 41½ E.,	distant 58 miles.
Point Pinos Light-house	S. 50° E.,	distant 39½ miles.
Point Año Nuevo fog-whistle	S. 47° E.,	distant 5½ miles.
Montara Point fog-whistle	N. 31° W.,	distant 22 miles.
Southeast Farallon Light-house	N. 59° W.,	distant 42½ miles.
Whistling Buoy off San Francisco Bar	N. 31° W.,	distant 37½ miles.

A notable feature on the low hillside behind the Light house is an apparently large white cemented field. It is the rain catchment area for the supply of the light-house station.

FOG-WHISTLE AT PIGEON POINT.

A twelve-inch steam fog-whistle has been established at Pigeon Point thirty-seven yards west southwest (WSW.) from the Light-house, and has been in operation during thick and foggy weather, day or night, since the 10th September, 1871. The characteristic notation of this fog-signal is that *blasts of four seconds duration are separated by alternate intervals of seven seconds and of forty-five seconds.* This fog-signal must not be mistaken for the steam-whistle at Point Año Nuevo Islet, only five and a quarter miles to the southeastward, and which has blasts of ten seconds duration with regular intervals of fifty-five seconds.

The *landfall* when off Pigeon Point and Point Año Nuevo is *Black Mountain*, twenty eight hundred and nine feet in height, in latitude 37° 19′ north, longitude 122° 09′ west, and lying thirteen and a half miles north forty degrees east (N. 40° E.) from Pigeon Point. It is one of the peaks of the Peninsula of San Francisco, and is visible from seaward forty-eight miles from shore.

When off Pigeon Point the first conspicuous landmark to the northward is *Mount Zaremba*, fourteen and a half miles north eight degrees west (N. 8° W.) from the point, together with the wooded flat ridge of Sierra Morena, about twenty-eight hundred feet in elevation, just to the east and southeast of Zaremba. Sierra Morena is five miles from the shore at the mouth of the Purisima Creek. Beyond these, and nearer the coast, is Montara Mountain, nineteen hundred and forty feet high, and one and three quarters miles inside the shore at Montara Point. It lies north twenty-seven degrees west (N. 27° W.), twenty-three miles from Pigeon Point.

Deep sea soundings west of Pigeon Point.—These soundings were made by the U. S. steamer *Tuscarora* on December 20th and 21st, 1873; they begin just outside the one-hundred fathom line, nineteen and a half miles north eighty-six degrees west (N. 86° W.) from Pigeon Point. They are given in detail on page 163.

These soundings indicate that the one-thousand-fathom line and the deep plateau of the Pacific are a little farther off shore than abreast the Sierra Santa Lucia. Very curiously, the deep sounding of two thousand one hundred and sixty-five fathoms is only six miles northeast (NE.) of one of the assigned positions of the Vitula Rock.

Point Bolsa.—This is the Cape Tonquin of Tebenkoff and others, and is one mile northwest from Pigeon Point; it is a slight projection, rocky, but quite low. The three-fathom curve is only

four hundred yards from the shore, and the twenty-fathom line one and one-fifth miles from the point. The Light from Pigeon Point shows over Point Bolsa.

This is the southernmost point visible from Montara Point, the line cutting just outside Point Pescadero. Montara fog-whistle bears north thirty-one degrees west (N. 31° W.), distant twenty-one and a quarter miles.

Pescadero Point lies four miles northwest by north (NW. by N.) from Pigeon Point, and has the same general appearance as the two preceding. The shore-line is nearly straight, without kelp, and the fifteen fathom line, with hard bottom, is about one mile off shore. There are ledges of rocks within the three-fathom line, which reaches out six hundred yards half a mile to the northwest of the point. There is a *sunken rock*, with seventeen feet upon it, lying six hundred and fifty yards south by west half west (S. by W. ½ W.) from the point, and well outside the three fathom curve. Another *sunken rock*, with fourteen feet of water upon it, nearly one-third of a mile off shore and outside the three fathom line, lies nearly one and a half miles southwest by south half south (SW. by S. ½ S.) from the point and almost on line to Point Bolsa.

About one and a half miles southeast of the point there is the opening of a small creek with a pebbly beach.

Broad off Pescadero Point the thirty fathom line lies three-and-a half miles from shore; bottom soft green mud; the fifty fathom is six and one-third miles, soft green mud; the one-hundred fathom line is sixteen miles off shore, with bottom of fine green sand; thence the bottom slopes rapidly to five hundred fathoms at about twenty-five miles.

One and one half miles north of this point empties the Pescadero Creek, a small stream coming from between the flanking spurs of the San Francisco Peninsula mountains. This stream receives the Butano just before it empties into the ocean. On the north side of the mouth of the Pescadero there is a good sand beach; on the south side, towards the point, is a low reddish cliff. With a hazy atmosphere over the land the long, low, dark southern point, half a mile long, comes out plainly. There are two or three houses on it about half a mile from its northern extremity. At certain times of the day the cliff of the south point is in shadow and shows black against the well lighted up north shore cliff inside.

From the Arroyo del Año Nuevo to the Pescadero, the general formation of the immediate sea-board is that of a table-land of the three terraces, the lowest gradually sloping from the crest of the second to the coast; the underlying stratum is sandstone; the dark crest line of the mountains inland is covered with pine.

From Pescadero Point to Pillar Point, which forms the southwestern point of Half Moon Bay, the general direction is northwest by north (NW. by N.), and the distance fifteen and one-half miles. The shore retreats about two and a half miles to the eastward in the first eight miles. The cliffs have a smooth yellow and chalky appearance, and present quite vertical faces towards the sea. South of Pescadero Creek the color of the cliffs is reddish and more irregular.

Three and a quarter miles northward of the Pescadero opens the *San Gregorio*, another small stream. When off the mouth of the San Gregorio valley, a large broad barn is seen in the head of the valley about one mile in from shore. Two miles still further north opens the *Tunitas*, across which is seen a lattice bridge.

The sea-board between Pescadero Creek and a point two miles north of the Tunitas presents a striking change both in the character of its topography and its geology. Instead of the broad table lands we meet with flanking or transverse spurs of the San Francisco Peninsula mountains coming squarely upon the coast, and reaching elevations of six hundred feet within a mile of the sea. The shore line and the coast generally present a broken and rugged appearance, cut by the deep gulches cutting through them. There is no kelp along this part of the coast.

Gordon's Chute.—Seven and one third miles to the northward of Pescadero Point, and one mile north of the Tunitas Creek, the shore makes a sharp turn to the westward for half a mile under a vertical white cliff over one hundred feet high, but, like most of the other small indentations, affording little or no shelter from the westerly swell. The shore line is bluff and rocky; near the western part of the head a wharf has been built out with a very large and well constructed chute for shipping produce upon the steamers and schooners which load here. Good moorings outside the chute.*

* The Gordon Chute, built in 1872, was destroyed in the great southeast gale of November 17th, 1878. It was over one hundred feet high, and securely guyed with wire-cables, the crests of the breakers frequently breaking twenty feet over it. In the present gale it is supposed to have blown away by the force of the wind. The chute will not be rebuilt (1886).

Sierra Morena, 2,540 feet

Pescadero Creek, E. by S., 7 miles

Sierra Morena, 2,540 feet.

San Gregorio Creek.
The Crest Line between Pescadero Creek and

San Gregorio Creek. Pescadero Creek, E. by S., 8 miles.

ine between Pescadero Creek and Sierra Morena.

There is a reef of sunken rocks, upon which the sea sometimes breaks, a little over two hundred yards west from the end of the chute. The head mooring for the chute has fifteen fathoms of chain, and the anchor lies just on the inside edge of this reef. The distance from the buoy to the chute is estimated to be about two hundred yards.

From Pillar Point, Gordon's Chute bears south forty-three degrees east (S. 43° E.), distant nine miles.

One-half mile off the beach to the southward of Gordon's Chute, and off the mouth of Tunitas Creek, schooners anchor in seven fathoms over hard sandy bottom.

Eleven miles hence to the northward, to Montara Point and including the shores of Half Moon Bay, the shore is a cliff bordering a narrow strip of table-land which flanks the high and bold mountains. All the hillsides and shores are devoid of timber, which is found in moderate abundance only along the arroyos and borders of the streams. The mass of redwoods cresting the mountains of the peninsula ceases abruptly abreast of Point Miramontes, and only stragglers are seen to the northward. They are a good mark for recognizing this part of the coast when coming in from the sea. No kelp lies off this stretch of the coast-line.

*Point Miramontes.**—Fifteen miles northwestward from Pigeon Point and four and a half miles southeastward from Pillar Point, is the rounding curve of Point Miramontes, which is the bluff edge of a long table-land stretching for ten or eleven miles from the Lobitos Creek, near Gordon's Chute, to Point Montara. It does not show as a point except when a vessel is dangerously close inshore either north or south of it. The Purisima and the Pillarcitos Creeks break through this mesa. For a mile along the point there are large rocks inside the three-fathom line. There is no kelp along the shore hence to Half Moon Bay. The mouth of the Purisima Creek is two miles southeast of Point Miramontes, and six and a half miles south forty-eight degrees east (S. 48° E.) from Pillar Point. It empties directly into the sea from a height of thirty-five or forty feet, with high cliffs on either side. In 1886 it is reported that the receding of the upper part of the overfall has changed the appearance of this cascade. The Pillarcitos is quite small and its mouth not easily detected.

From Pescadero Point to Pillar Point the three-fathom curve is almost uniformly one-quarter of a mile from shore, without any known danger outside of it. From Point Miramontes for four miles to the southeast there are numerous rocks under the cliffs, and some of them reaching nearly to the three-fathom limit.

The bottom along this stretch of coast is fine dark sand and hard. The depth of water offshore increases very gradually to thirty fathoms at five miles, over fine green and gray sands. Hence the increase of depth is quite regular to one hundred fathoms at nineteen miles, with a bottom generally of fine green sand.

North of Pillar Point the thirty-fathom line of soundings stretches straight for the Southeast Farallon for two-thirds the distance.

PILLAR POINT.

This headland is nineteen and one-third miles northwest by north (NW. by N.) from Pigeon Point, and eighteen miles south by east (S. by E.) from the Golden Gate of San Francisco. It is a wooded table land, rising to one hundred and eighty one feet above the sea, and forms the western point of Half Moon Bay. The old Spanish name for it is the Corral de Tierra. A low, contracted neck connects the point with the mainland toward the north. There is foul ground marked by kelp around the point, especially from the south round into Half Moon Bay. Three hundred and seventy-five yards south of the extremity of the point stretch a number of black rocks, which show white when coming up the coast, but as three or four when seen from the northwest. The largest is nearly as high as the bluff and locally known as Sail Rock or Pillar Rock.† It extends about one hundred and twenty-five yards southwest and northeast, and the high, pillar-shaped portion is at the southwest extremity. From the southeast side of Pillar Point, rocky and foul bottom, marked by kelp, extends southeast one-third east (SE. ⅓ E.) seven-eighths of a mile, dropping suddenly from fourteen feet to five fathoms. This danger and the detached rocky shoal further southeastward are marked by buoys, and will be further described under the head of Half Moon Bay.

* Named from the Rancho of the same name. On some of the documents it is spelled Moramontez.

† In 1850 it was called Steeple Rock.

There is a flagstaff on the highest part of the point, used by the whalers to signal to their boats. The triangulation station of the Coast and Geodetic Survey was on the summit of the hill, within a few feet of this flagstaff, and its geographical position is—

Latitude	37° 29′ 48″.0 north.
Longitude	122° 29′ 55″.7 west.
Or, in time	8h 09m 59s.7

The magnetic variation was 16° 25′ east, January 1, 1885, and increasing 0′.5 annually.

There are several well-known *landmarks* for this vicinity, frequently visible over the low fog and haze which sometimes lie close along the shore and hide its peculiarities: *Bald Pate*, a rounding mountain, without trees except on its flanks, is five miles north sixty degrees east (N. 60° E.) from Pillar Point, and just north of a sag in the ridge where the road passes over into the Cañada del Raymundo. It is about fourteen hundred feet high. The further ridge south of the depression is covered with redwood, but the nearer ridge rises to a pyramidal mountain, higher than Bald Pate, bare of trees except a few stragglers on the slope near the summit. This is the *Mount Zarcmba* already described under the head of the landfall off Pigeon Point. It bears south seventy five degrees east (S. 75° E.), distant eight miles from Pillar Point.

Cumbra de las Auras.—A bold peak, four miles north forty-six degrees east (N. 46° E.) from Pillar Point. It is higher than Bald Pate.

Montara Mountain, four and one-third miles north of Pillar Point, dark, bluntly pyramidal, and treeless. It is nineteen hundred and forty feet above the sea.

HALF MOON BAY.

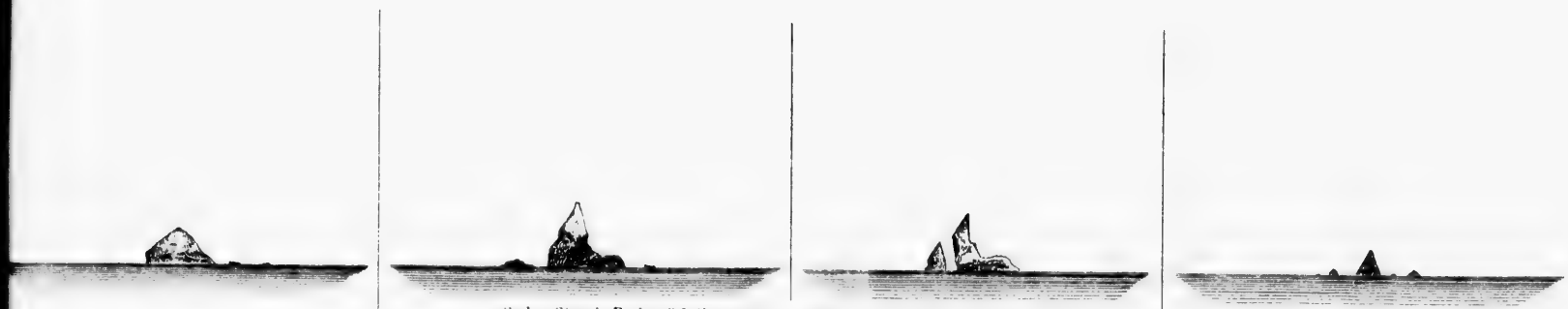
This northwest anchorage is formed by Pillar Point (just described), on the west, and the long curving shore which stretches over two miles to the northward and round to the eastward and southeast at Amesport. The rocky ground stretching one mile southeast from Pillar Point, and known as the Inner or Pillar Point Reef, makes the bay available as a good summer anchorage. With light southerly winds a heavy swell sets in, and it is exposed to the full sweep of the southeasters; sailing vessels should be ready to go to sea on the approach of bad weather. Some steamer captains report that they have been lying here during a heavy southwest swell when the bar of San Francisco was breaking badly.

One and three-quarters miles southeast from Pillar Point a narrow ledge of rocky bottom, one-third of a mile long and marked by kelp, stretches in the same general direction as the Inner Reef. The passage between this Outer or Southeast Reef and the Inner or Pillar Point Reef is three-quarters of a mile wide between the three fathom curve, with rocky and irregular bottom, having from three and a quarter to ten and a quarter fathoms over it. These ledges are the southeast submarine extension of the detached ridge forming Pillar Point; and the northwest extension of the same ridge is the Colorado Ledge off Montara Point. The southeastern extremity of the Outer Reef off Pillar Point is distant one and three eighths miles from the eastern shore of Half Moon Bay.

From the eastern extremity of Pillar Point the shore of the bay runs northwest by north (NW. by N.) for a quarter of a mile; then northeast (NE.) for three quarters of a mile; thence it curves to the eastward and southeastward in a long bend for two and half miles to the mouth of the Arroyo de los Pillarcitos, upon which is situated the village of Spanishtown, one mile from the shore. The Outer Reef is nearly abreast of the mouth of the Pillarcitos. From this point the shore runs south four miles to Miramontes Point; thence to the mouth of the Tunitas, the distance is four miles southeast. The greatest extent of the bay may be said to be between Pillar Point and Miramontes Point, but only the part near the former is available for anchorage.

The soundings between the rocky ledges and the shore are quite regular, decreasing from nine fathoms to three fathoms at less than a quarter of a mile from the beach, with sandy bottom. The passage to the anchorage generally used by sailing vessels and steamers is between the Inner and Outer Reefs, which are marked by buoys; but steamers approaching from the southward also use the passage between the Outer Reef and the main shore. One of the steamers reported striking a rock on the northwest extension of the Outer or Southern Reef, where the depth given is at three and a quarter fathoms.

The most conspicuous objects in the bay are the Amesport wharf and the large white warehouse at the base of it. On the northern shore of the bay is the school-house, painted dra[illegible] with a square end towards the water. After rounding Pillar Point the coasters generally ste[illegible]



Sail or Steeple Rock, off Pillar Point, Half Moon Bay (as seen from seaward).

Pillar Point, E. by S., 3 miles. Sail or Steeple Rock. Half Moon Bay.

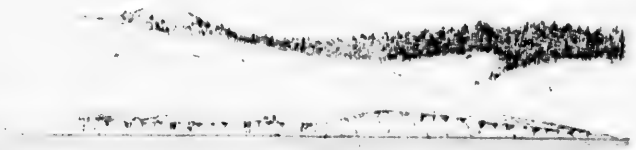
Pigeon Point Light-house, SE. by E. ¼ E., 5 miles.

Point Ano Nuevo, SE. ¼ E., 10 miles.

Mount Carmel, 4,417 feet, SE. ¼ E., 62 miles.

Pico Blanco, 3,660 feet

Coast towards Half Moon Bay.



Gordon's Chute Cliff, NE. by N., 4 miles.

Montara Point Fog-signal.

Sail or Steeple Rock.

Pillar Point, N.NW., 9 miles

for this school-house to their anchorage. The wharf close under the point and the large unpainted ware house are in the shadow of the head and not easily distinguished.

BUOYS IN HALF MOON BAY AND APPROACHES.

A second-class *can-buoy painted black*, and *numbered* 1, marks the southeastern extremity of Pillar Point Reef, and lies in seven fathoms of water. From it Sail Rock bears northwest by west three quarters west (NW. by W. ¾ W.), distant one and one-twelfth miles; the old wharf, just inside of Pillar Point and in the line with the eastern edge of the reef, northwest (NW.), distant one and a half miles; Amesport wharf bears northeast one-eighth east (NE. ⅛ E.), distant one and one sixth miles, and in line with Bald Pate; and Red Buoy No. 2 bears southeast by south (SE. by S.) half a mile distant.

A second class *can-buoy, painted red*, and *numbered* 2, marks the inner edge of the northwest end of the Southern or Outer Reef, and lies in five fathoms of water. From it Sail Rock bears northwest three quarters west (NW. ¾ W.), distant a little over one and a half miles; Amesport wharf north northeast (N. NE.), distant one and three-eighths miles; and Spanishtown east half north (E. ½ N.), distant two and a quarter miles to the shore. The black buoy on the southeast end of the Inner Reef bears northwest by north (NW. by N.) half a mile distant.

A second class *can-buoy, painted black*, and *numbered* 3, marks the southeast end of the southern or Outer Reef, and lies in six fathoms of water. From it Sail Rock bears northwest three-quarters west (NW. ¾ W.), distant two miles; Amesport wharf north five-eighths east (N. ⅝ E.), distant one and five-eighths miles; and Spanishtown east by north one-eighth north (E. by N. ⅛ N.), nearest shore distant one and a third miles. The red buoy is in line to Sail Rock, and distant nearly half a mile.

These buoys are sometimes found a short distance inshore from these prescribed positions.

SAILING DIRECTIONS TO HALF MOON BAY.

If bound into Half Moon Bay under steam for an anchorage, pass between the black and red buoys, with the Amesport wharf bearing northeast by north (NE. by N.), and steer for it; haul up gradually into the bay and anchor in four to six fathoms over hard sand. With a sailing vessel, when inside the Pillar Point black buoy, with the usual summer winds, beat up until Pillar Point bears about southwest (SW.) half a mile distant, and anchor in four and a half fathoms, hard sand bottom. Working up from the southward, sailing vessels beat inside the Outer Reef to get rid of the swell; and steamers can run a mile from shore in nine fathoms.

Amesport Landing.—The old landing for Half Moon Bay was in the northwestern part of the bight just east of Pillar Point; but the wharf built there has been abandoned, and a new one constructed from the eastern cliff nearly two miles east two-thirds north (E. ⅔ N.) from the extremity of Pillar Point. Sailing vessels can now pass between the two reefs and haul up directly for this wharf. There are three good mooring-buoys lying off it. The trade is principally done by steamers which can lie at the wharf.

The Coast and Geodetic Survey has published a chart of Half Moon Bay (1863), and its characteristics and relation to the coast are shown in the chart from Point Pinos to Bodega Head.

Half Moon Bay is quite clearly shown in the chart of Vizcaino of 1602, but he does not refer to it in his narrative. The latitude of Pillar Point was determined in 1769 by Don Miguel Constanzo as 37° 31′, and he named it Point Guardian Angel. It was from the mountains back of Half Moon Bay that the expedition of Junipero Serra in 1769 first saw the Bay of San Francisco, the Farallones, and Point Reyes. The point is also called the Punta de Corral Tierra in recent Spanish documents.

Whalemen's Harbor.—About one mile along the shore to the northwestward of the extremity of Pillar Point is a small boat-harbor known as Whalemen's Harbor. It lies directly under the highest part of the mesa ridge just northwest of Pillar Point. The ridge is two hundred feet high with low land behind it, and declines to the northwest. The anchorage is one hundred yards wide, formed and protected by outlying dikes of rock, and has three and a half fathoms of water. A large outlying ledge and a mass of kelp lie off it to the northwestward and form a sort of breakwater to the entrance, which has four or five fathoms. A depth of three fathoms can be carried in for four hundred yards, with an average width of eighty yards. The entrance is

open directly to the south, and the channel gradually curves to the east. In the autumn months, it is used as a whaling station from which the boats ply upon the appearance of whales. This refuge is shown on the Coast Survey chart of Half Moon Bay.

MONTARA POINT.

Two and three-quarters miles, north forty degrees west (N. 40° W.) from Pillar Point, lies Montara Point, upon which a light-house is to be built as one of the aids to the approaches to the Golden Gate. The point is the westernmost reach of a long curve of low bluff, which stretches from Pillar Point northward for three miles, and is backed by a narrow, flat valley opening on Half Moon Bay and just south of Montara Point, thus separating the ridge forming Pillar Point from the high lands to the northeastward. There are several short stretches of sandy beach between Pillar Point and Montara Point close under the cliffs. The cliff at the point is about SIXTY feet above the sea, guarded by rocks for one or two hundred yards outside, and rises in gentle slopes to a broken, narrow table of three hundred feet elevation that extends back one and a quarter miles; it then rises abruptly in the next two miles to Montara Mountain.* This mountain is nineteen hundred and forty feet above the sea, very steep, and is destitute of timber. It is a good landfall and landmark. The ridge comes abruptly upon the sea at its northwestern extremity, forming Point San Pedro, three and a half miles north by west half west (N. by W. ½ W.) from Montara Point. (For a further description of Montara Mountain and Point San Pedro see Approaches to San Francisco Bay, pages 167 and 169.)

POINT MONTARA FOG-WHISTLE.

A twelve-inch steam fog-whistle has been placed (1875) upon the top of the bluff of Point Montara. In day-time the buildings serve as an aid to navigation, although they are really very inconspicuous even at two miles. The fog signal building is painted light buff, and the keeper's dwelling, of wood, one and a half stories high, about thirty yards from the former, is also painted light buff with dark buff trimmings.

The distinctive character of the fog signal is: *a blast of five seconds* with an *interval of twenty-five seconds*. A duplicate steam whistle is ready for use in case of accident to the one sounding.

In southeast weather the Montara fog-signal has been heard off Point Lobos and on the Bar of San Francisco, at a distance of fifteen miles.

From Montara Point we have the following bearings and distances to prominent points:

Pigeon Point Light-house	S. 32° E.,	distant 22 miles.
Southeast Farallon Light-house	N. 85° W.,	distant 23½ miles.
Whistling-buoy off San Francisco Bar	N. 44° W.,	distant 14⅛ miles.
High Rock off Point San Pedro	N. 21° W.,	distant 3½ miles.
Point Boneta Light-house	N. 20° W.,	distant 17 miles.

From Montara Fog-signal station, Point Boneta Light shows between Point San Pedro and the rock off it.

Montara Point was named by the U. S Coast and Geodetic Survey in 1873.

The Colorado Ledge.—Between Pillar Point and Montara Point, the granite sub-surface ledges stretch out from the bluff shore and form rocky dikes with deep water between them. These dikes appear to be nearly vertical strata with the softer parts washed away. Their general direction is that of the two hundred foot detached mesa ridge whose southeast extremity forms Pillar Point and the reefs off it. They are also parallel to the southwest face of the mountain base about half a mile inshore. Whaleman's Harbor is formed by two of these dikes.

A special watch was made from shore for the breakers on these dikes after a heavy storm in January, 1884, and the following facts established:

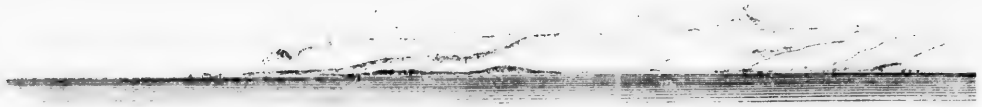
A *break* four-fifths of a mile south nineteen degrees west (S. 19° W.) from Montara Fog whistle.

A *break* nearly three-fifths of a mile south forty degrees west (S. 40° W.) from the fog whistle.

A *break* just over half a mile south seventy-seven degrees west (S. 77° W.) from the fog whistle.

These appear to be the outer ends of three long and parallel dikes stretching from the southeast shore. Between these and inside of the northern one, the depths reach ten fathoms. Outside of them, heavy heavings of the sea were seen for six hundred yards farther.

* On the old English charts it is called Clara Mountain. De Mofras (1841) calls it Saint Clar



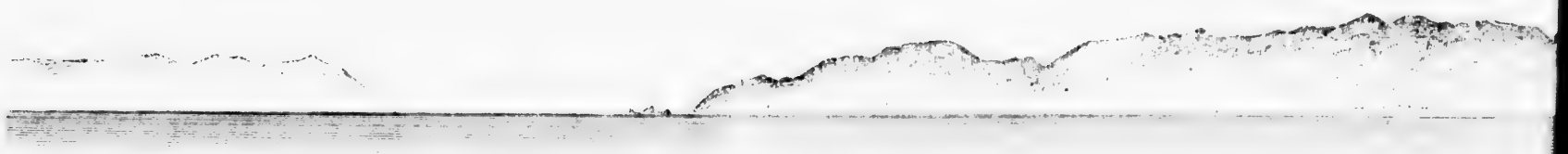
Point San Pedro, N. by W. ¼ W., 12 miles. Pillar Point, N. ½ W., 7 miles. Clouds.

Point San Pedro, N. by W., 10 miles. Montara Point Fog-signal. Pillar Point, N. by E. ½ E., 4½ miles. Half Moon Bay.

Sail or Steeple Rock. Pillar Point, N.NW., 2 miles. Half Moon Bay.

San Pedro Cove. Montara Mountain, 1,940 feet.
Point San Pedro, E. by S. ¼ S., distant 11 miles

Approaches to the Gulf of the Farallones, from the Southward.



2,604 feet. 2,592 feet.
Mount Tamalpais, N. by W. ½ W., 31 miles.

San Pedro Rock.
Very smoky and hazy inside. Point San Pedro, N. ¼ W., 11 miles.

Land under the shore, in thick haze.

Point Reyes Ridge, 42 miles, 1,389 feet. Valley behind Ballenas Bay

The irregular depths given by the few lines of soundings that are exhibited on the chart indicate very foul bottom out to thirteen fathoms of water at least, and it is therefore imprudent for any vessel to approach the shore nearer than one mile; yet coasting steamers are reported passing inside the location of the breakers.

The line of twenty fathoms is found one and a half miles off the shore, but stretches up through the middle of the Gulf of the Farallones. The thirty fathom curve is four miles distant southwest from the fog-whistle, and stretches thence almost on a straight course more than half way to the Southeast Farallon.

The shore immediately south of the fog-whistle has a low bluff from twenty to sixty feet high, with a low, flat valley behind it, so that vessels in hazy or dark weather may mistake their distance from it; because to the south and north the high bluffs and mountain flanks come more boldly to the water. The steam-ship *Colorado* struck this ledge November 9, 1868, and the ship *Acalco* was lost upon it in 1873.

THE GULF OF THE FARALLONES.[1]

GENERAL DESCRIPTION.

The great indentation of the coast of California between Point San Pedro, in latitude 37° 35′ north, and Point Reyes, in latitude 38° 00′ north, has been very aptly characterized by one of the old Spanish navigators as the Gulf of the Farallones. This designation almost describes the islands which mark its western limit. The coast line in the deepest part of the gulf, where the mountains are nearly a thousand feet high, has been ruptured where the Golden Gate gives connection between the Pacific Ocean and the Bay of San Francisco.

The commerce of the world enters the Golden Gate, and the Bay of San Francisco affords the finest and most commodious harbor on the Pacific coast of the United States. From its discovery it has commanded the admiration of navigators, and since the wonderful rise of California has well sustained its reputation. Its geographical position; its great area and depth of water; its noble entrance and bold shores; the Sacramento and the San Joaquin and their tributaries draining the rich agricultural valley of California and the auriferous slopes of the Sierra Nevada; the magic cities upon its shores, and the salubrity of its climate—all these conditions have conspired to make it emphatically the Port of the Pacific.

It is especially important that the descriptions of the landfalls, the approaches, the dangers, the aids to navigation, the weather, currents, etc., should be given as fully and as clearly as practicable. Different plans of procedure are open for adoption. Each has its advantages and its disadvantages. Breaking through the continuous description of each succeeding headland and bay, as heretofore pursued, we give the titles of special matters treated in connection with San Francisco Bay, merely premising that the bottom of the Gulf of the Farallones is a great plateau of reasonably uniform depth, never exceeding fifty fathoms of water. The approaches to this plateau from the southwest are quite sudden from the profound depths of the bed of the Pacific Ocean to the one thousand-fathom line. The two-thousand-fathom line is only fifty miles, and the one-thousand fathom line only nineteen miles outside the one-hundred-fathom line. The lead is a safe guide on soundings. The headlands of San Pedro and Point Reyes are bold and without outlying dangers. The Farallones have bold water around them, and are free of known hidden dangers except Noonday Rock, off the North Farallones; Hurst Rock, off the Southeast Farallon, and a five-and-one-quarter-fathom rock off the Middle Farallon. Mount Tamalpais, to the northward of the Golden Gate, is a fine landfall and landmark; and the mountains south of the Golden Gate reach nearly two thousand feet at Montara.

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[1] [illegible] was first seen by Cabrillo and Ferrelo on their first return from the northwestward in 1542. Ferrelo says: "On the sixteenth of November, at daybreak, they were upon a large gulf, which was formed by a change of the direction of the shore [Point Reyes], which appeared to have a port and a river, and they went beating about that day and the night and the Friday following until they saw that there was no river nor any shelter; and to take possession they cast anchor in forty-five fathoms. They did not dare to land, on account of the high sea. This gulf is in thirty-nine degrees and more, and it is covered with pines to the sea. They gave it the name of La Bahia de los Pinos. The following night they lay-to until the next day." [The correction to his latitude is about one degree, more or less.] Cabrillo says: "They arrived at a great gulf that looked like a harbor, and they called it Bahia de Pinos."

[illegible] not see it when going north, nor when going and returning on the second voyage.

[illegible] Don Bruno Ezeta (Heceta), captain of the *Nueva Galicia*, made a land expedition from Monterey Bay to San Francisco Bay, and Palon (page 247) relates that they returned "al real que habiamos dejado á la orilla de una laguna grande que desagua en la Ensenada de los Farallones que se llamo Nuestra Señora de la Merced."

The Bar of San Francisco Bay carries a depth of thirty-four to thirty-five feet at low water, and through the Boneta Channel a depth of nine fathoms can be carried. There is no hidden danger on the bar or its immediate approaches, or on the range-line through the Boneta Channel, and the bottom throughout the Gulf is good holding ground.

The high mountains on the east side of San Francisco Bay and the islands in the bay afford capital ranges for entering. Mount Diablo, Mount Helena, and Black Mountain afford long and excellent ranges in good weather.

The light-houses, steam fog whistles, and buoys afford ample aid to navigation. Pilot boats cruise to the limits we have designated as the Gulf of the Farallones. Steam-tugs are available to assist vessels entering or leaving, in ordinary traffic or in emergencies.

All the information concerning the approaches to the Bay of San Francisco is arranged in the following order for convenient reference:

(1) *General Description*, just given.
(2) *Deep Sea Soundings off the Gulf of the Farallones*, pages 162, 163.
(3) *Falmouth Shoal in the Pacific, off the coast of California*, pages 163, 164.
(4) *Vitula Shoal, off the Gulf of the Farallones*, page 165.
(5) *Cordell Bank, off Point Reyes*, pages 165, 166.
(6) *Landfalls for the Gulf of the Farallones*, pages 166 to 168.
(7) *Detailed description of islands, capes, and the shores of the Gulf of the Farallones, including the Golden Gate and islands, rocks, and shoals, aids to navigation, etc., in San Francisco Bay*, pages 169 to 190.
(8) *Dangers in the approaches to San Francisco Bar.**
(9) *San Francisco Bar and the Channels.*
(10) *Buoys off the entrance to San Francisco Bay.*
(11) *General Sailing Directions for approaching and entering San Francisco Bay.*
(12) *Sailing Directions when coming from the southward.*
(13) *Sailing Directions when coming from the westward.*
(14) *Sailing Directions when coming from the northwestward.*
(15) *Approaching the Bar in heavy southeast weather.*
(16) *General Directions for vessels approaching San Francisco in thick weather.*
(17) *Anchoring on the Bar.*
(18) *Leaving the Harbor of San Francisco.*
(19) *The Tides at San Francisco.*
(20) *The Currents of the Golden Gate and approaches.*
(21) *Daily Temperature of the water in the Golden Gate in the month of January for ten years at 7 a. m.*
(22) *Monthly Temperature of the air and water in the Golden Gate for ten years*, 1874-'83.
(23) *The Winds on the Pacific coast.*
(24) *The Fogs on the Pacific coast.*
(25) *The Seasons.*
(26) *Barometric indications of weather.*
(27) *Temperature of the air and water along the Seaboard.*
(28) *Description of Light houses and other aids to navigation on the inland waters of San Francisco Bay and its subdivisions, with General Sailing Directions.*
(29) *Discovery of San Francisco Bay.*

Deep Sea Soundings off the Gulf of the Farallones.—In 1873 the U. S. steamer *Tuscarora* ran several lines of soundings off the coast of California and Oregon, among which were two directly off the Gulf of the Farallones; one off Point Reyes, page 163; and another off Point Arena, page 136.

* For the pages of this and succeeding headings see Index.

The experimental line run in August, 1873, is as follows:

Miles from Southeast Farallon Light.	Latitude.	Longitude.	Depth (fathoms).	Temperature.		Character of bottom.
				Surface.	Bottom.	
	° ′	° ′		°	°	
12	37 30	123 01	141	58.6	.....	Blue mud.
15	37 28	123 05	503	59.0	.....	Do.
18	37 28	123 13	830	59.0	37.0	Do.
23	37 27	123 21	1,015	59.3	36.5	Do.
28	37 25	123 26	1,196	59.1	36.0	Do.
32	37 27	123 33	1,361	59.0	35.0	Do.
50	37 21	123 55	1,949	59.0	.....	Do.

The line run November 5 and 6, 1873:

Miles from Southeast Farallon Light.	Latitude.	Longitude.	Depth (fathoms).	Temperature.		Character of bottom.
				Surface.	Bottom.	
	° ′	° ′		°	°	
160	37 33	126 17	2,443	.....	.....	Brown and greenish ooze.
118	37 34	125 25	2,257	.....	34.6	Whitish clay and ooze.
29	37 40	123 36	1,726	.....	.....	Brown ooze.
7½	37 39	123 08	*135	.....	.....	Gray sand.

* There is some slight error of position or of depth in this sounding.

On the 20th and 21st of December, 1873, the steamer ran another line commencing just outside the one hundred-fathom line about nineteen and a half miles north eighty-six degrees west (N. 86° W.) from Pigeon Point, as follows:

Miles from Southeast Farallon Light.	Latitude.	Longitude.	Depth (fathoms).	Temperature.		Character of bottom.
				Surface.	Bottom.	
	° ′	° ′		°	°	
23½	37 20	122 51	113	54.1	.....	Greyish-black sand.
24½	37 18	122 54	181	55.0	.....	Do.
27	37 15	122 59	358	56.1	39.8	Do.
30	37 12	123 05	673	53.2	.....	Hard, black sand.
40	37 07	123 22	1,200	53.2	.....	Greyish-black sand and fine gravel.
75	36 48	124 03	2,165	53.9	.....	Greenish mud.
78	36 37	123 56	2,104	53.8	33.1	Do.

These soundings indicate that the one-thousand-fathom line and the deep plateau of the Pacific are a little farther off shore than abreast the Sierra Santa Lucia. Very curiously, the deep sounding of two thousand one hundred and sixty-five fathoms is only six miles northeast of one of the assigned positions of the Vitula Shoal; and the deep sounding of two thousand one hundred and four fathoms, thirteen miles from the last-mentioned sounding, is only three miles from another assigned position. This last sounding is the outer one of the line from Point Carmel already referred to.

Falmouth Shoal in the Pacific, off the coast of California.—Seven hundred and fifteen miles westwardly from the Golden Gate, in about latitude 37° 25′ and longitude 137° 30′, dangerous sunken rocks have been at various times reported as having but three to five fathoms upon them. In previous editions of the Coast Pilot we gave such information as we had gathered, and after obtaining positions from seven or eight different sources we directed a survey of the locality. The reported positions, very curiously, only range seven minutes of arc in longitude and seventeen minutes in latitude, and are here given lest such dangers may actually exist:

Assigned positions.				Remarks.
Latitude.		Longitude.		
37	24	137	32	1850, brig *Emma*, Captain Reed, saw two rocks, one hundred and fifty fathoms by sixty-six; one hundred fathoms by thirty-eight; three and five fathoms of water on them, respectively.
37	24	137	27	1851, U. S. sloop of war *Falmouth*.
37	35	137	30	1856, whaler *Susan Abigail*, Captain Redfield, June 6, good observations. Rocks with ten feet, and long ribs of kelp growing on them; largest rock, fifty by one hundred and fifty feet.
37	28	137	28	Ship *Kuttosoff*, anchored upon a shoal in five fathoms and reported three rocks above water in form of a triangle.
37	30	137	34	Bark *Cambridge*.
37	18	137	30	Imray's chart, 1869; five to seven fathoms.
37	21	137	28	Admiralty chart, 2461, corrected to March, 1865. + Reed Rocks, †, three fathoms.

Schooner *Hannah*, Reddet, reports getting casts in three, five, and six fathoms; and reports four or five saddle rocks entirely submerged.

One captain reports seeing bottom distinctly when running ten knots, and from the white water believes the shoal extends ten by forty miles.

Other commanders report getting into shallow water thereabouts.

Concerning these positions and reports we make the following remarks: The position of the Admiralty chart is doubtless the mean of *Emma* and *Falmouth* positions. Redfield reports good p. m. observations, repeated at the time of discovery, and had noon observations for latitude. *Cambridge* position was obtained by U. S. sloop of war *Kearsarge* at Honolulu, but Captain Brooks, of the *Cambridge*, wrote to us that he never heard of this report. Upon application to the Navy Department for an examination of the log of the *Falmouth*, it was reported not found in the archives. The barks *What Cheer*, in 1858, and *Live Yankee*, in 1863, report to have run over this position without seeing anything.

The U. S. sloop-of-war *Kearsarge* examined this ground by making three or four zig zags over it in September, 1870, in beautifully clear weather, with a moderately large swell that should have exhibited any ordinary break.

In 1871 the U. S. Coast and Geodetic Survey schooner *Marcy* especially examined that locality from July 23 to August 5, under favorable circumstances of wind and weather, and with a swell large enough to cause breakers in three fathoms, and at times very heavy. During that time the distance run was one thousand and fifty miles, of which seven hundred and seventy miles were made in daylight, when breakers or any discolored water should have been visible within at least one mile. A constant lookout was maintained from the mast-head, but no break was seen nor any indications of shoal water, such as gulls, seals, fish, or kelp. The water was uniformly of a deep blue, and soundings were made at various places at depths from three thousand to eighteen hundred and fifty fathoms with no bottom. The soundings were made with a specially fine line chosen for the purpose and heavily weighted. The track-chart shows how carefully the vicinity was examined and how the vessel was run over the supposed dangerous locality during the night.

In August, 1881, the U. S. steamer *Ranger* made an exhaustive examination of this locality by deep sea soundings. Within the area bounded by the parallels of 37° 05½′ and 37° 38′ and the meridians 137° 10′ and 137° 40′, embracing an area of seven hundred and fifty square geographical miles, twenty-nine deep-sea soundings were obtained, averaging two thousand eight hundred and ninety-nine fathoms, and ranging only from two thousand seven hundred and seventy-three thousand and ninety-seven fathoms. The bottom was blue mud and blue ooze. The approaches to this locality were marked by equally profound depths.

This examination confirms the judgment we expressed from the previous investigations that no dangers exist in the space assigned to them.

Subsequent to this special examination, lines of deep-sea soundings have been made across the Pacific Ocean from various points on the Pacific coast. In the assigned position of the Reed Rocks or Falmouth Shoal the latest soundings give nearly uniform depths of twenty-nine hundred fathoms over a bottom of brown ooze.

The reported seeing of the Reed Rocks in latitude 37° 38′ north, longitude 137° 31′ west, by the ship *British Yeoman* (1888) depends upon very unsatisfactory evidence.

Vitula Shoal, off the Gulf of the Farallones.—In January, 1863, the ship *Vitula*, Bearsley, reported discovering a shoal nearly eighty miles south-southwest (S.SW.) from the Southeast Farallon, having but five to seven fathoms of water upon it. Its geographical position, as given in the Nautical Magazine, is:

Latitude	36° 45′ north.
Longitude	124° 10′ west.

Subsequently many accounts were published of reported rocks, discolored water, and soundings. Some we found to be gross exaggerations; but upon the U. S. revenue cutter *Wyanda* reporting having obtained, in 1866, several soundings of sixty and sixty-five fathoms in this vicinity and towards the Southeast Farallon, her track was laid down upon a projected sheet, and in the winter of 1868 over seven hundred miles of soundings were closely run over the reported line of soundings, with one hundred to eight hundred fathoms without bottom. In the different examinations which have been made over this locality, an area of eighteen hundred square miles has been searched for this danger without a shadow of success, and we were satisfied that no such danger existed; but all doubts may be considered removed, for in 1874 the U. S. sloop of war *Tuscarora*, when sounding off the Pacific coast of the United States, and across the ocean to Japan, showed that the one-thousand-fathom curve lies only thirty miles off the main line of the coast, and the two-thousand-fathom curve from sixty to seventy miles off.

Part of her work was close to the reported positions of the Vitula Shoal. Six miles northeast (NE.) of the location assigned by Captain Bearsley of the *Vitula* the sounding is two thousand one hundred and sixty-five fathoms over green mud; and three miles east-southeast (ESE.) from another assigned position the depth is two thousand one hundred and four fathoms over green mud. Midway between two of the reported positions that were only five miles apart, Commander Erben, U. S. Navy, in November, 1874, found a depth of two thousand and forty-one fathoms over a bottom of blue mud.

The British ship *Eastern Light* reported the shoal to be in latitude 37° 16½′, longitude 124° 33′; and a special examination by the Coast and Geodetic Survey in May, 1874, found no bottom at one thousand fathoms within one mile of that position, whilst numerous soundings of two hundred and one hundred fathoms, without any bottom, indicated the non-existence of the danger where reported. It is curious that in the location of dangerous reef in the approaches to San Francisco the reported longitudes range through twenty-five miles and the latitudes through forty miles. In the case of the *Eastern Light*, elsewhere quoted, the log says that "observations for longitude were not taken next morning near the Farallones; chronometer apparently correct;" but the fact was that it was not correct.

The log of the *Eastern Light* shows that on the 3d March, 1888, she had light breezes and smooth sea with white-caps; and that she saw the supposed shoal at six p. m., when it was too late to notice the color of the water; but the spray broke over the deck. She was afraid to heave to the spot on account of its bad appearance. In conference with the Captain, it was found that the corrected position he assigns to it is latitude 37° 17¾′ north, and longitude 124° 20½′ west, or eleven miles from the published position above.

THE CORDELL BANK.

This is one of the three known submarine banks off the coast of California and Oregon; or it may be considered the northwest extension of the plateau of the Gulf of the Farallones, for the [illegible] depth between them is comparatively trifling.

It lies broad off the coast-line, in the latitude of Point Reyes, and on the prolongation of the line between the Southeast and North Farallones. A detailed examination has not been made of [illegible], but its general features are sufficiently known. Within the thirty-fathom line, the [illegible] about two miles long northwest and southeast nearly, and irregularly half a mile in breadth. The [illegible] of the bank lies south seventy-five degrees west (S. 75° W.) from Point Reyes Light, distant [illegible] fifteen miles; and north sixty four degrees west (N. 64° W.) from the Southeast Farallon

Light, distant twenty-seven miles. It is evidently on the edge of the coast plateau, just before it slopes off suddenly to the great depths of the Pacific; and on the inside, towards Point Reyes, the depth gradually increases to sixty-six fathoms over fine gray sand midway between them. On the southwestern side of the bank the depth increases to one hundred fathoms in two miles, and to two hundred fathoms in less than a mile more.

A curved ridge of about fifty-five to fifty-seven fathoms stretches southeastwardly towards the Noonday Rock and the Farallones, as if this whole line of islets, rocks, and banks were a partly submerged ridge parallel with the great backbone of the Peninsula of San Francisco, the ridge from Ballenas to Tomales, etc.

The least water given on the bank is twenty-five fathoms in two or more places, with rocky bottom and live barnacles. Outside the thirty-fathom line the bottom is given as coarse sand, broken shells, and live barnacles. But we have been assured that a vessel drifting over it in a dead calm found a depth of nineteen fathoms, and the lead brought up red, slimy material and a mass of coarse, red coral.

Over the bank the general set of the current is to the southward, and from one to one and a half miles per hour, whilst a decided change in the character of the swell is experienced. In the search for the bank, 1868, attention was first drawn to the locality of the shoal by numbers of seal, sea-lions, and marine birds which are reported to resort there. But these special signs of animal life were wanting in October, 1853, and at the time when the vessel found nineteen fathoms, as well as at the examination in 1873.

When on the bank in clear weather the principal landfalls of the coast-line are distinctly visible; Ross Mountain to the northward, Mount Helena, Point Reyes, Mount Tamalpais, and, from aloft, the Southeast Farallon. Five miles south southeast (SSE.) of the tail of the bank the Lighthouse on the Southeast Farallon is just visible from a vessel's deck.

We came upon this bank at night, in October, 1853, and found thirty fathoms with a decided change in the character of the swell. The latitude was determined by observation, but no longitude observations were obtained. Attention was called to the facts in the first edition of the Coast Pilot. In 1868 several attempts were made to find the bank, but bad weather always intervened, and even at the last search, when it was found, the weather became very bad after the work was commenced. During the examination in 1873 only a few hours were available for work during a period of two weeks.

The Cordell Bank is a fine fishing locality. The red and the black rock cod, halibut, etc., are found there in great numbers, and are caught by the ordinary hook and-line fishing. A company was organized in 1884 to fish on Cordell Bank by anchoring small schooners on it and having a steam tender to bring the fish to San Francisco. Trawling, or anchoring long lines with baited hooks attached, was attempted, but the seals and sea-lions destroyed the fish before they could be hauled in. Owing to mismanagement, not to the lack of fish, the company failed to make it profitable. There was in 1885 a small steamer engaged in fishing on the bank.

Reported Shoal in the Gulf of the Farallones.—The British ship *Drumlanrig* reported that on the 18th of November, 1888, a depth of thirty-five fathoms of water over rocky bottom was found thirty-five miles southwest from the Southeast Farallon. The vessel was in a thick fog and no reliable judgment could be formed of her position. In the position reported there is a depth of about fifteen hundred fathoms. The vessel was close under the Southeast Farallon, or close under the main shore.

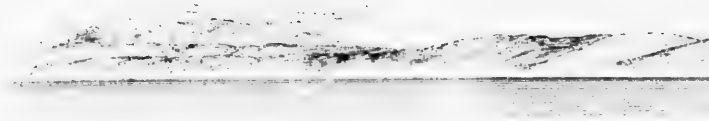
LANDFALLS FOR THE GULF OF THE FARALLONES.

In clear weather the high mountains along the sea-board north and south of San Francisco, and the higher mountains some distance inland in the parallel ranges, are clearly distinguishable at sea at distances even greater than fifty miles; and the lights on the Southeast Farallon and Point Reyes Head are distinguishable at twenty-five and twenty-four miles respectively, so that a vessel has many advantages in good weather in making easily recognized landfalls which serve to check her position and control her course. The more prominent of these landmarks are enumerated with their geographical positions, elevation, distance at which visible from a ship's deck, and characteristic appearance.

The Southeast Farallon and Light-house.—A pyramidal islet of granite with bold, rocky approaches, in latitude 37° 41′ 51″.4 north, longitude 123° 00′ 07″.0 west, elevation three hundred and sixty feet. The light is visible from a ship's deck twenty-five to twenty-seven miles, from seven

Point Reyes Light-house,
SE. by E., 6¾ miles.

Point Reyes Ridge Light-house, SE. ¾ E., 17 miles
land.

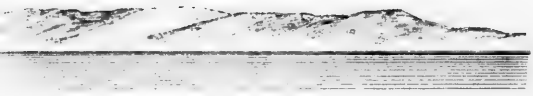


Mount Tamalpais, 2,604 feet, E. ¼ S., 25 miles.

Mount Tamalpais, 2,604 feet, on clouds, 35¼ miles.

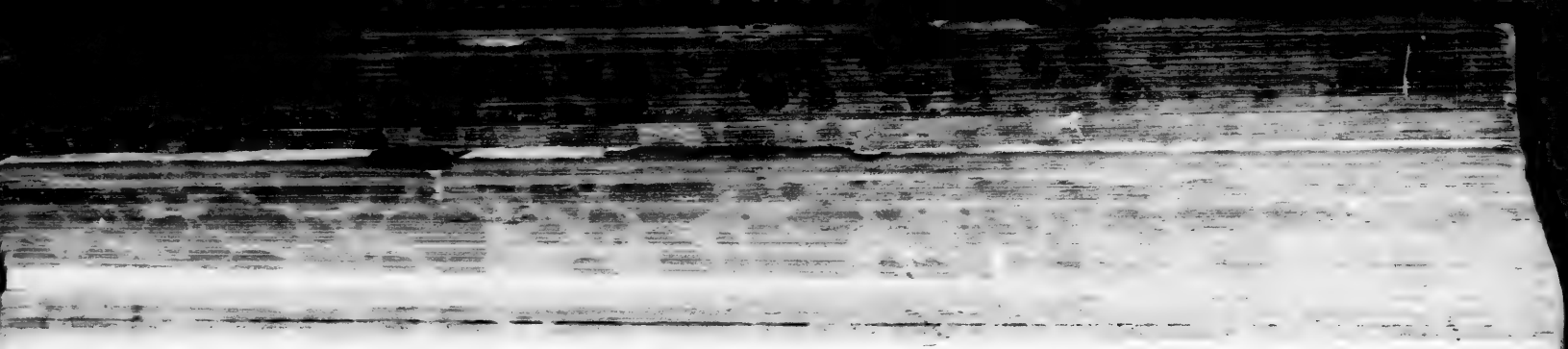
Point Reyes Ridge, 1,350 feet, 20 miles.

Head, 597 feet. Point Reyes Light-house, SE. by E., 6¾ miles.



Low land north of Point Reyes.

Point Reyes head as an island.
Point Reyes Light-house, SE. ¾ E., 17 miles.



Ross Mountain, 2,205 feet, NE. by E. ¼ E., 13¼ miles; coast-line in haze

Point Arena Light-house, N. by W. ¼ W., 8 miles.

All the back country in haze and smoke.

to nine miles northward of Point Reyes, and when a vessel is abreast of Montara Point. It is just below the horizon on the Cordell Bank, and just visible from a vessel's deck when in the Golden Gate. For detailed description see pages 199, 200.

Point Reyes Head, in latitude 37° 59′ 38″, longitude 123° 01′ 21″, elevation five hundred and ninety-seven feet. It is visible from a ship's deck at a distance of thirty-two miles. From the southwest it is projected against the Point Reyes Ridge, fourteen hundred and eighty feet high, and lying eight miles to the northeast of it. The intervening land is so low that Point Reyes Head shows as an island from the southeast and northwest; in hazy weather it is seen as an island from the southwest also, as the high land behind is hidden. In clear weather it can be seen seventeen miles outside the North Farallones and fourteen miles beyond the Southeast Farallon. Point Reyes Light is on the pitch of the western extremity of the head, two hundred and ninety six feet above the sea, and can be seen at a distance of twenty-four miles from a vessel's deck. For detailed description of the Light see pages 196, 197.

Ross Mountain lies three miles in from the coast-line in latitude 38° 30′ 11″.4, longitude 123° 07′ 43″.7, and has an elevation of twenty-one hundred and ninety-eight feet. It shows a small, round topped summit marked by two or three tree tops on its side of nearly the same elevation, very distinctly seen in clear weather from the vicinity of the Cordell Bank.

It is visible fifty-seven miles at sea from a vessel's deck, or sixteen miles beyond Point Arena Light-house, fifty-three miles outside of Point Reyes Light-house, and seven miles to the southward of the Southeast Farallon.

Mount Helena.—This massive, broad-topped mountain lies nearly thirty miles in from the coast-line in latitude 38° 40′ 04″, longitude 122° 38′ 01″, and attains an elevation of four thousand three hundred and forty-three feet. It can be seen from a ship's deck seventy-nine miles, or seventeen miles outside the Southeast Farallon. The view gives a fair idea of its appearance.

*Mount Diablo** lies thirty miles to the east-northeastward of the Golden Gate, in latitude 37° 53′ 48″.7, longitude 121° 54′ 51″.9. It attains an elevation of thirty eight hundred and forty-eight feet, and is visible from a ship's deck seventy-five miles, or eighteen miles outside the north Farallones. It shows as a pyramidal peak over the Contra Costa mountains east of San Francisco Bay, and, when seen between the Middle and the North Farallones, the Golden Gate is in line with it. One of the views shows Mount Diablo in range with Point Lobos.

Mount Tamalpais† or *Table Mountain*, the western peak of which is in latitude 37° 55′ 20″.00 longitude 122° 35′ 45″.83, attains an elevation of twenty-six hundred and four feet and is visible from a ship's deck sixty-two miles, or thirty-five miles outside the north Farallones, and forty miles outside of Point Reyes Head. From the south and southwest it shows three summits, of which the westernmost is slightly the highest, the middle one the lowest, and the easternmost the sharpest. The mountain is covered with bushes and scrub trees, which give it a dark appearance in contrast with the grass-covered slopes of the surrounding hills, more especially noticeable in the summer season when the latter assume a light red tint.

Montara Mountain is in latitude, 37° 33′ 38″.5 longitude 122° 28′ 51″.8. This is a sugar-loaf peak so closely surrounded by other peaks of nearly the same elevation that from seaward it appears as a rather broad-topped mountain having three small peaks and equal sloping sides. The highest peak rises to an elevation of nineteen hundred and forty feet above the sea. It is less than two miles back from the coast, and it should be visible from a ship's deck fifty-five miles, or twenty-three miles beyond the North Farallones and eighteen miles outside of Point Reyes.

San Bruno Mountain.—The western end of this long ridge is eight miles (SE.) of the Golden Gate in latitude 37° 41′.1, longitude 122° 26′.1. It has an elevation of thirteen hundred and fifteen feet and is visible from a ship's deck forty-five miles, or eighteen miles beyond the Southeast Farallon and eleven miles beyond Point Reyes.

Las Papas‡ or *The Paps*.—This term, designating two mountain tops showing suggestively from certain parts of the city of San Francisco, is apt to be misleading to the navigator who cannot make them out distinctly from seaward. This is because they are part of a mass of elevated grass-covered hills, locally known as the "Mission Hills." Of this mass four small peaks (of which "The Paps" are two) have an elevation of nine hundred and twenty to nine hundred and thirty eight feet; but when it is seen from certain directions outside the heads of San Francisco Bay, it has really the appearance of a moderately high table land with these insignificant

*An old Spanish chart calls this the Sierra de San Juan Bautista.

†Meaning the country of the Tamals, an Indian tribe that inhabited the northern peninsula.

‡Named by Beechey in 1826; known as Los Pechos de la Choco by the Spaniards.

peaks breaking its outline. The Paps lie south thirty-eight degrees east (S. 38° E.) three ... three-quarters miles from Fort Point, in latitude 37° 45′.0, longitude 122° 26′.85. One peak ... this mountain mass, reaching nine hundred and twenty feet elevation, lies three fifths of a ... northwest of them; and another peak of nine hundred and thirty-eight feet lies nine tenths ... mile south half west (S. ½ W.) from them. This latter peak is the most isolated.

They are visible from a ship's deck thirty-nine miles, or thirteen miles outside the South ... Farallon, eight miles outside the North Farallones, and eight miles outside Point Reyes Head.

The Tamalpais Peninsula of San Francisco Bay.—The high land northwest of the Golden ... reaches nine hundred and twenty feet elevation just north of Point Diablo, and also one ... three-quarters miles northwest (NW.) from Point Boneta. This land is visible from a ship's ... at thirty-nine miles, or twelve miles beyond the North Farallones, and fourteen miles beyond Point Reyes. The crest-line of this peninsula is Mount Tamalpais.

The general depression between Las Papas and the Tamalpais Peninsula indicates the br... in the mountains forming the Golden Gate to San Francisco.

Black Mountain, on the peninsula of San Francisco, in latitude 37° 19′.0, longitude 122° 08... with an elevation of twenty-eight hundred feet, is visible from a ship's deck at a distance of ... four miles, or forty-nine miles outside the coast-line and nineteen miles south of Pigeon P... This mountain is known as the Loma Prieta by the Spaniards.

Mount Bache, the southern culminating point of the great mass of the peninsula of ... Francisco, is in latitude 37° 06′ 34″.1, longitude 121° 50′ 40″.0. It is thirty-seven hundred ... ninety feet above the sea, and is visible from a ship's deck at seventy-four miles, or forty ... miles beyond Pigeon Point Light, and forty-four miles south of Point Pinos Light. The summ... of the mountain is somewhat conical, and rises well above the general crest line.

The range of mountains stretching from the northern shore of Monterey Bay to Point ... Nuevo, and lying between the San Lorenzo River and the ocean, is called the *Sierra Santa ...* The main chain of mountains lying between the ocean and San Francisco Bay and Santa ... Valley is called the *San Francisco Peninsula Mountains*. The chain is in fact a continuation of ... Gavilan Mountains from the south, but broken through by the Pajaro River, which empti... Monterey Bay.

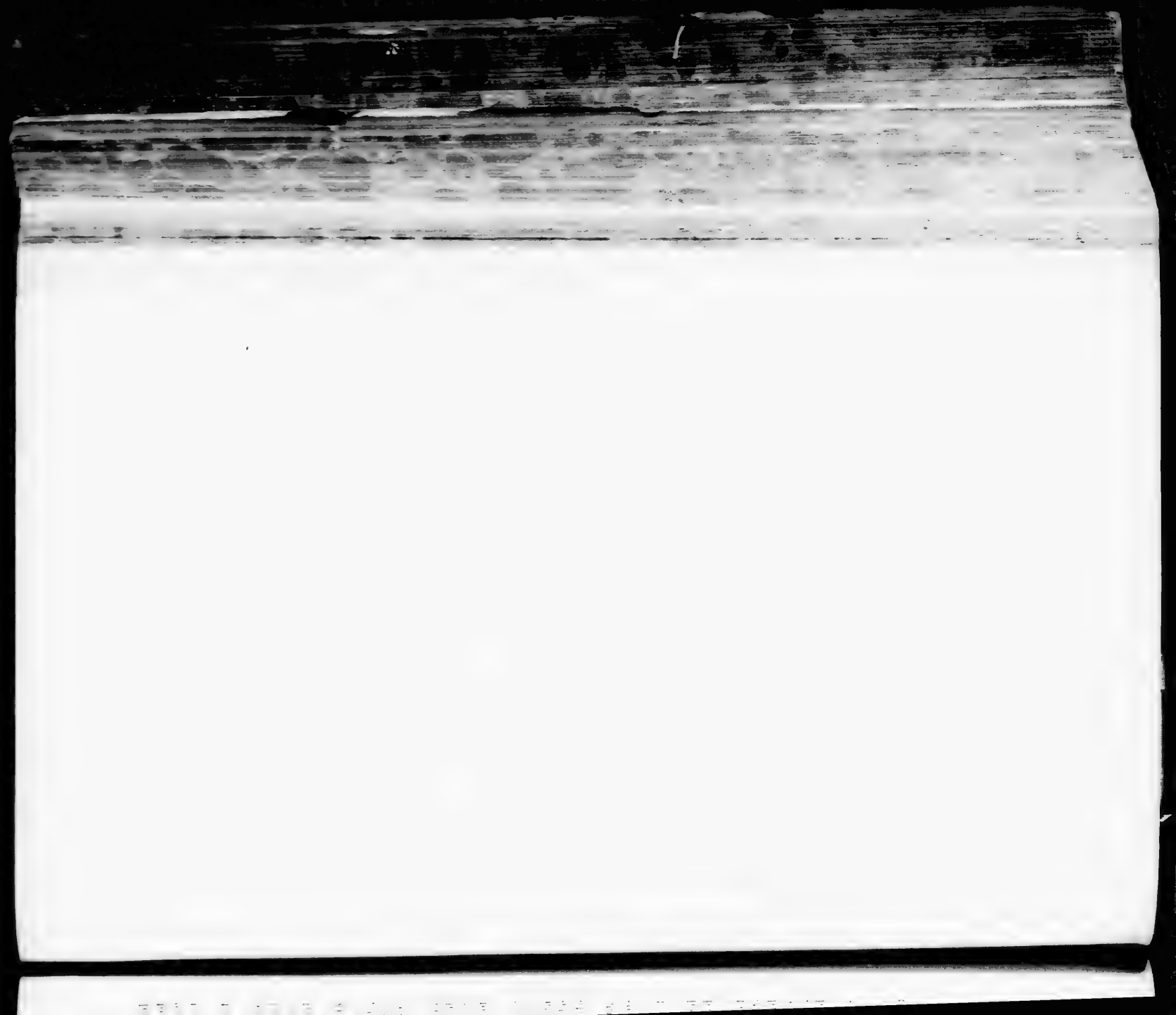
After a vessel has made the land and entered the Gulf of the Farallones, a very not... feature is the stretch of sand-dunes on the peninsula of San Francisco south of Point ... (shown in view), which reach from the ocean beach in towards and covering the foot of the ... sion Hills. Southward of these sand-dunes are the white, sandy cliffs stretching towards ... San Pedro.

If the vessel has entered the gulf from the north the great white cliffs east of Drake's ... thence to Ballenas form a special designation of the locality. These are the cliffs which ... Sir Francis Drake to call this country New Albion.

Sometimes a low fog or haze covers the lower portion of the land, but then the sum... the hills may be distinctly visible above it. Mount Tamalpais to the north, and Montara M... ain, San Bruno Mountain, and the Paps or Mission Hills showing as one mass to the so... of the Golden Gate, furnish at such times excellent landmarks to determine a vessel's pos... which to proceed towards the bar. This haze frequently exists when the Farallones sho... and outside of them is seen a low fog-bank which the approaching sea-breeze will bring ... by which everything will be densely covered in a short time.

In the very pleasant and clear weather of spring and autumn, when the winds are ver... and variable, and calms prevail, the black pall of smoke from the city of San Francisco w... times drift for miles to the westward and envelope the beach south of Point Lobos, and obs... Golden Gate; so that strangers approaching the bar may not be able to make out the He... must then locate themselves by the whistling buoy or by bearings on Tamalpais, Montara ... Paps. With the least westerly wind this smoke is swept away to leeward.

" Called " Blue Hill " by Beechey, but designated Blue Mountain on the last Coast Survey chart of ... cisco entrance.



Point San Pedro, N. by W., 5 miles.

Montara Point Fog-whistle, 2 miles

Point San Pedro, SE. ¼ E., 4 miles.

Montara Point Fog-whistle, SE. by S., 8 miles.

Point San Pedro, SE., 5 miles Hazy, and fog cloud on hill tops

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DETAILED DESCRIPTION OF ISLANDS, CAPES, AND SHORES OF THE GULF OF THE FARALLONES, INCLUDING THE GOLDEN GATE AND ISLANDS, ROCKS, AND SHOALS, AIDS TO NAVIGATION, ETC., IN SAN FRANCISCO BAY.

Point San Pedro.—The first landfall made directly by vessels coming upon the coast south of the southeast Farallon is the prominent mountain ridge stretching as a great backbone southeastwardly down the peninsula of San Francisco from Point San Pedro. It rises gradually in height from this point, with a slight depression abreast of Half Moon Bay, for forty miles to Mount Bache, thirty-eight hundred feet high, lying north of Monterey Bay. It is a bold, compact line of mountains coming squarely down on the coast-line, off which lie no known dangers one mile from shore. The abrupt and precipitous northern termination of this mountain range is Point San Pedro.

In three miles north by west three-quarters west (N. by W. ¾ W.), the coast-line from Montara Point runs to Point San Pedro nearly straight, but changing its characteristics remarkably. The three fathom line lies close under the rocky cliffs, and the fifteen-fathom line is one mile off the shore over hard, rocky bottom southward of Point San Pedro.

Point San Pedro is a black, very bold, rocky promontory six hundred and forty feet in elevation: having a high, large, jagged rock at the northern part, and is a prominent and excellent mark for making the entrance to San Francisco, especially in coming from the southward. The ocean face of this mountain for two and a half miles to the southward is very precipitous; and one-quarter of a mile towards Montara Point it attains an elevation of one thousand and ninety feet half a mile from the sea. It is very abrupt on its north face, and falls suddenly to the low marshy ground of the San Pedro valley in half a mile from the point.

A triple-headed, well marked rock lies one-quarter of a mile west of the point, and reaches an elevation of nearly one hundred feet. Its south face is white and shows the line of stratification plainly. Seen from the west, the dip of the strata is about sixty degrees to the northward. It is connected with the main-land by some low rocks. This is known as the San Pedro Rock.

When Point San Pedro bears southeast, five miles distant, with the rocks off it hidden by dark weather, and the top of the ridge covered with fog, it may be readily known by an apparently single pyramidal hill rising abruptly and breaking the general slope of the mountain towards the southwest. This is the hill, three hundred and forty feet high, lying on the immediate shore line two miles westwardly from the summit of Montara Mountain. As the fogs lifts, or the point is approached, the rock will be seen inside, or apparently to the eastward of this hill; and the low bluff towards Point Montara will show outside of it.

A depth of six fathoms is found close to San Pedro Rock, and twelve fathoms one-third of a mile outside. But to the northeastward, in the small bight formed at the low opening of the San Pedro valley, a depth of eight fathoms is found half a mile off shore and the same distance from the rock. Well into this small bay five and a half fathoms of water is carried, and sometimes the fishermen have used it as an anchorage in southerly weather, although reported to have foul ground. A rock lies just off the point at the north of this anchorage.

The geographical position of the rock off Point San Pedro, as determined by the Coast and Geodetic Survey, is:

Latitude	37° 35′ 29″ north.
Longitude	122° 31′ 26″ west.
Or, in time	8ʰ 10ᵐ 05ˢ.7

The following bearings and distances are given to prominent objects seen from the rock off Point San Pedro:

Point Montara Fog-whistle	S. 21° E., distant 3¼ miles.
Southeast Farallon Light	S. 88° W., distant 24½ miles.
Whistling Buoy off San Francisco Bar in fifteen fathoms	N. 51° W., distant 11½ miles.
Point Bonita Light-house	N. 18° W., distant 13¾ miles.

Montara Mountain lies south thirty degrees east (S. 30° E.) three miles from Point San Pedro.

At Point San Pedro the nearest aid to navigation is the fog-whistle already described at Point Montara.

In early Spanish charts this point was called Punta de Aumenas. In 1769 Don Miguel Constanzo determined the latitude of Point San Pedro by bearings and estimated distance from Pillar Point, and described it as "the land near the harbor of San Francisco, having the Farallones on

the west quartering north [latitude] 37° 35′." In June, 1770, Don Salvador Fidalgo calls it La Punta de Almejas, in latitude 37° 33′.

This point is mentioned, but not named, by Admiral José Cabrera Bueno Gonzales, 1734, as lying fourteen leagues southeast one-quarter south from Point Reyes; and before reaching it the land is of moderate height, broken, bare of timber near the sea, with cliffs, etc., evidently referring to the comparatively low shores north of Point San Pedro.

On old English charts it is named Cape Blanc; on the first U. S. Coast Survey charts it was called Point San Piedras.

Point San Pedro to Point Lobos.—The coast-line for eleven and a half miles from Point San Pedro northwardly to Point Lobos retreats about a mile to the eastward in a long curve, and is marked by the openings of short narrow valleys and the rocky spurs of intervening ridges, while the middle four miles of shore is marked by a broken bluff reaching an elevation of seven hundred and twenty feet in one place. This was known as "White Cliff" by Beechey. At eight and a half miles northward of Point San Pedro the bluff ceases, and a long broad sand beach, backed by high sand dunes, stretching two or three miles inland, begins at the debouching of the Laguna de la Merced. The large building known as the "Ocean Side House" lies directly on the beach about three miles south of Point Lobos, and abreast the southern limit of the San Francisco Bar. This is the only large house along the beach until we reach Point Lobos, and is a good mark, especially if made in openings of the fog (1884). There is a cluster of large houses near the beach at the meeting of the sand dunes and the rocky head of Point Lobos; and half a mile southward of these houses is the small boat-house of the U. S. Life-Saving station.

Across the northern and eastern part of the sand dunes rise the grassy summits of the four hundred and twenty foot hill, "Round Top," and "Lone Mountain," four hundred and sixty-eight feet high, surmounted by a large white cross. At the southern and eastern part of the dunes rise Black Ridge to seven hundred and eighty-three feet, and the Mission Hills to nine hundred and twenty-five feet. Through the sand dunes the Golden Gate Park is being gradually covered with trees and herbage that will in time change the peculiar aspect of this waste.

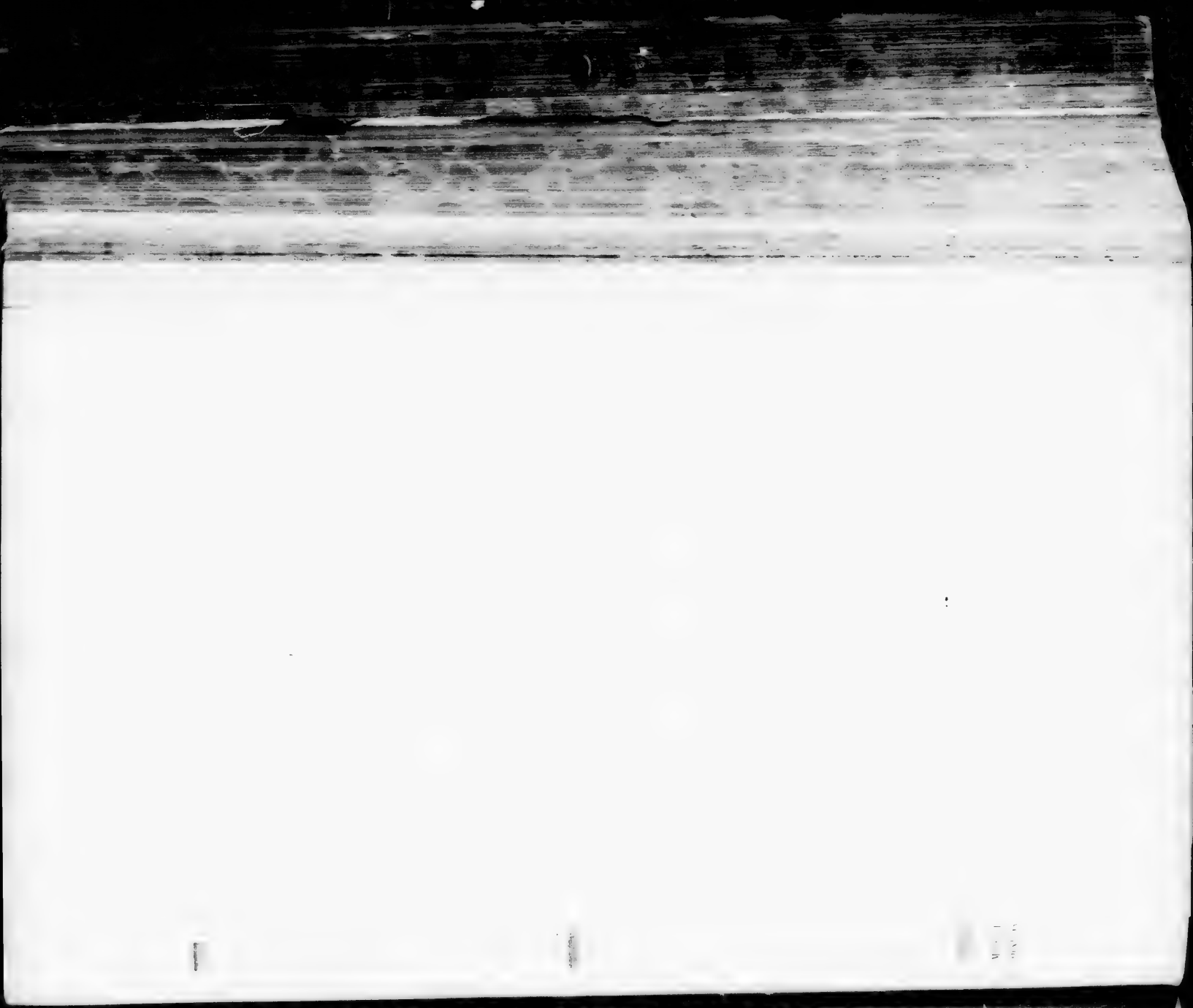
THE BAY OF SAN FRANCISCO.

THE GOLDEN GATE AND ITS SHORES.—GENERAL DESCRIPTION.

*The Golden Gate** is the entrance to the bay, and presents the character of a great cleft or fissure in the sea-coast range of mountains, thereby connecting the bay of San Francisco and its rivers with the Pacific Ocean. On approaching it in good weather it is difficult to imagine that a deep channel lies ahead, so clear is the atmosphere, and so well defined the Contra Costa mountains beyond the bay. The north head of the entrance is Point Boneta, a high, black rocky point, marked by a Light-house and fog-whistle and continuous high rocky shore to the northward, and the south head is Point Lobos, a high rounding cape with black, rugged cliffs at its base and a cluster of high rocky islets lying close under its western face and three miles of white sand dunes just to the southeastward of it. Inside of these heads both shores are high, bold, broken at points, and rocky; but the northern is much bolder, rising almost perpendicularly from the water, attaining an elevation of about one thousand feet but a short distance back, and in several culminating at Mount Tamalpais, twenty-six hundred and four feet above the sea. On the south side, between the points, are stretches of low beach backed by rising ground; the hills undulating and of moderate elevation, increasing very gradually in altitude to the southeastward, reaching a height of thirteen hundred and fifteen feet on the San Bruno Mountain, seven miles southeast of Point Lobos. The charts of San Francisco Entrance by the Coast Survey show the bold and characteristic topography of the vicinity of the Golden Gate, whilst the chart from Pinos to Bodega Head shows the approaches and entrance to San Francisco, and gives all that can be desired by the navigator.

Inside the bar of San Francisco a vessel may anchor anywhere, and the depth of water increases gradually to twenty-five fathoms on the line joining Points Boneta and Lobos. There is good water close off the Seal Rocks which guard the western face of Point Lobos. They lie southeast by south one-sixth south (SE. by S. ⅙ S.), distant two and one-eighth miles from Point Boneta, and do not contract the width between the heads. Inside the heads the depth of

* In a map drawn by order of the Senate of the United States, in 1848, the Golden Gate is called the "Chrysopylæ or Golden Gate."



North Farallones, N. ¼ W., 5 miles.

Drake's Bay, 20½ miles.
Point Reyes Light-house, N. ¼ W., 19 miles.
Approaches to San Francisco Bay from the Southwest.

The Northern Shores of the Gulf of the Farallones.

The North and Northeastern Shores of the Gulf of the Farallones.

Mount Tamalpais, NE., 29 miles.
Duxbury Reef, NE., 22½, miles.
Middle Farallon, NE., 4½ miles.

...t Tamalpais, NE., 29 miles.
...bury Reef, 22½ miles.

Golden Gate,
NE. by E. ¼ E., 30½ miles.

Southeast Farallon Light-house,
E. by N. ¼ N., 5 miles.

Point Reyes Light-house, N. by E., 14 miles.
Mt Tamalpais, 2,604 feet, NE. by E., 28 miles.
Duxbury Point.

Southeast Farallon.
E. by S., ¾ S., 94 miles.

Approaches to San Francisco Bay from the Southwest.

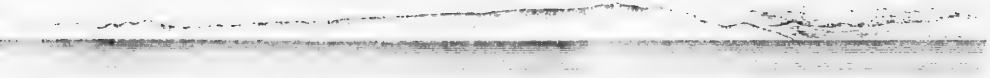
Point Reyes Light-house, N. by E., 14 miles. Drake's Bay.

Approaches to San Francisco Bay from Noonday Rock.

Smoke

North Farallone
157 feet, E. ¼ S., 3 r

Montara Mountain, 1,940 feet, E. ¼ N., 31 miles.



o Bay from Noonday Rock.

Mount Tamalpais, 2,604 feet. NE. by E., 28 miles.

Duxbury Point.

North Farallones,
157 feet, E. ¼ S., 3 miles.

Middle Farallon,
E. by S. ¼ S., 7¼ miles.

Southeast Farallon,
E. by S. ¼ S., 9¼ miles.

Mount Tamalpais
2,604 feet, NE. by N. ¼ N., 19 miles.

The Golden Gate.

Mount Diablo, NE. by E. ¼ E., 47 miles.

Lime Point Fog-siren, NE. ¾ E., 20 miles.

Point Lobos, NE. by E. ¼ E., 18 miles.

The shores of the Gulf of the Farallones (from inside the Farallones).

San Bruno Mountain, 1,325 feet

Montara Mountain, 1,940 feet, E. by S., 20 miles.

rapidly to sixty-three fathoms in the narrowest part of the entrance, between Fort Point on the south and Lime Point on the north, where the width is only seven-eighths of a mile, and the bearing of the former south by east three quarters east (S. by E. ¾ E.) from the latter. Thence the bay opens well to the northeast and the soundings gradually decrease. No hidden dangers have been discovered outside the line between Lime Point and Fort Point except very close inshore. Deep water exists around the Mile Rocks, between Point Lobos and Fort Point. But two sunken rocks lie close under the eastern side of the inner Mile Rock; and a sunken rock has been found outside the line joining the outermost visible rocks under the shore abreast of Mile Rocks. A four and a half fathom rock, which may have less water upon it, has been located in the passage inside the Mile Rocks. Pilots now avoid this channel.

Even without artificial safeguards and pilots, the Golden Gate would be one of the very safest entrances, as practically tested by the earlier navigators and by the many thousand vessels that have entered and left it in the earlier years of California's development. Yet we find that Beechey (Vol. II, p. 3) says:

> The reef of rocks lies three-quarters of a mile from Point Boneta, while some scattered rocks, with deep water between them, skirting the shore on our right (upon entering), marked that side also as dangerous."

It is difficult to properly characterize such an erroneous judgment. There is no reef off Point Boneta, but the deepest channel is close around it, and we must suppose that Beechey's boats missed the heavy current rips, making off the point at certain stages of the tides, for breakers on a sunken ledge. The Mile Rocks are above water and have deep water close up to them, with dangers inside them already noted and hereafter particularly described.

On the *north side of the Golden Gate* the shores are very high and precipitous, with an occasional short stretch of sand beach at the base of the bluffs, affording a boat landing. Point Diablo is the first point inside Point Boneta, and bears northeast by east two-thirds east (NE. by E. ⅔ E.) distant one and a half miles from it. Between these points the shore is indented about three-quarters of a mile. In the vicinity of Point Diablo the faces of the cliffs show a reddish-purple color. The few red specks found on the bar are probably derived from the disintegration of these reddish cliffs.

From Point Diablo the shore is jagged and irregular to Lime Point Bluff, four hundred and sixty-five feet high, distant one mile and bearing northeast three-quarters east (NE. ¾ E.). Under this point are several high rocks, but they are so close to the base of the bluff as to be distinguishable only from certain directions.

On the *south side of the entrance*, eastward from Fort Point, the shore is low, flat, and marshy to Point San José, distant two and a half miles, and bearing east by north (E. by N.). This point is moderately high and is occupied by the United States as Fort Mason. It is locally known as Black Point. Off this reach was the "outer anchorage" of former navigators, and the Presidio of San Francisco is seen a short distance behind it. The shore-line is now bordered by numerous buildings, factories, wharves, etc.

From Black Point or Point San José to North Point, at the base of Telegraph Hill, the distance is three quarters of a mile and the bearing east northeast (ENE.). All this space forms part of the city of San Francisco, and is covered with houses over hilltops and valleys. The shore line was formerly denominated the "North Beach," but is now being built up with a great fill from which wharves are to project out into deep water. A long stone house has been built over this section of the sea wall.

Telegraph Hill rises to a height of three hundred and one feet above the mean level of the sea, was covered with houses until recently when the summit was opened as a park and the houses removed. However, a large white, castellated structure stands on the north side of the summit and at night a brilliant electric light shows ninety-nine feet above the hill. From the top of a flag staff on the main tower of this castellated building a time service ball is dropped every day at exactly twelve o'clock, standard time (one hundred and twentieth meridian, or eight hours from Greenwich).

From Telegraph Hill San Francisco Bay opens to the southward for twenty-seven miles with an average width of five or six miles. To the northward it stretches ten miles to Point San Pablo where it is contracted to one and two-thirds miles in width, but beyond that it expands and forms what is known as San Pablo Bay, which is really only the northern part of San Francisco Bay. The city of San Francisco embraces the northern extremity of the peninsula of San Francisco with the ocean front round by and including the Golden Gate, and southward along the bay shore

beyond Hunter's Point, five miles southeast from Telegraph Hill, covering one hundred sq... miles. The main front now used by deep sea vessels extends from near Black Point to Po... Point. The harbor is under the direction and control of a State Harbor Commission, and ves... not brought to the wharves must anchor within certain prescribed limits designated by th... Deep-sea vessels discharge and load not only at the front of San Francisco, but also at the ... of the Central Pacific and South Pacific Coast Railroads, extending into the bay from the east... shore at Oakland and Alameda; and others pass up the bay through the San Pablo and Karqu... Straits to Vallejo, Port Costa, Antioch, and other localities.

Inside the Golden Gate, deep-sea vessels are nearly always under tow of steam-tugs ex... when coming in with the summer winds, which are favorable.

The State Board of Harbor Commissioners has adopted certain rules for the governme... vessels in the port of San Francisco. They are given in the appendix.

With the "Heads of San Francisco Bay" we continue the detailed description of t... points, etc.

The "Heads" of San Francisco Bay.

Point Lobos.

This is the "Southern Head" of the entrance to San Francisco Bay, and lies at the nort... extremity of the sand dunes of the peninsula of San Francisco. It bears south thirty-three d... east (S. 33° E.), distant two and one-eighth miles, from Point Boneta, which is the "Northern Head." It is a bold, rocky, rounding point, closely guarded by the cluster of four rocks, called the *Seal Rocks*, of which the two outer and principal ones rise forty-three and thirty-sev... above the water. The southwestern and higher rock has a large arch through it as seen fr... northeast and southwest. The northern rock, two hundred and fifty yards from the poi... a depth of five fathoms all around it, but the channel is not wide enough for a safe passage... Upon these rocks are large numbers of sea-lions. Among the pilots they are known as the ... Rocks."*

Point Lobos rises abruptly to a round head three hundred and eighty feet above the s... marked by small sand patches. Upon the point directly abreast of the South Seal Rock is ... white house, sixty feet above the sea, on the brow of the perpendicular bluff. It bears ... spicuous sign marked "Cliff House." Other and very large buildings lie under the south... of the point at the limit of the sand dunes (1884); and improvements are being made on the ... above the Cliff House. Steam cars now run from the south side of the head for a mile ... with the beach. Southward of this point the long, low line of sand beach can not be reco... thick, foggy weather, and the lead must be used, and attention paid to the direction in w... Boneta Fog-whistle is heard. The sea-lions on Seal Rocks, however, keep up an almost c... roaring, which is a good guide in thick weather, as these are the only rocks near the ... where they congregate. In clear weather the miles of drifting white sand dunes which ... beach form a conspicuous and easily recognized feature of the approach from some dist... side the bar.

The Life-Saving station has a boat-house on the inside of the beach half a mil... ward of the Seal Rocks.

The *Fog-trumpet* formerly located on the pitch of Point Lobos has been discont... there is at present no aid to navigation on Point Lobos. The French chart No. 1979, 1862, with corrections to 1869, has erroneously placed a light house on Point Lobos.

The pilots and shipmasters complain that under certain atmospheric conditi... from the Cliff House sometimes mislead vessels approaching the Golden Gate. It ... that, as the city of San Francisco advances westward towards the ocean, other lig... fere with the regular aids to navigation, and especially electric lights placed upon h... in the city limits, such as that on Telegraph Hill.

On the northwestern slope, and near the summit of Point Lobos, is located "Te... graph Station" of the marine reporter for the Merchants' Exchange of San Francisco... are reported as soon as their number or name can be made out from this station.

* Punta de los Lobos; *i. e.*, Point of the [Sea] Wolves.

The following bearings and distances to prominent objects are given from the South Seal Rocks, off Point Lobos:

Montara Point Fog-whistle	S. 16° E.,	distant 14½ miles.
Point San Pedro	S. 16° E.,	distant 11 miles.
Southeast Farallon Light	S. 60° W.,	distant 23½ miles.
Whistling buoy outside the bar	S. 65° W.,	distant 6¾ miles.
Inside bar buoy	S. 81 W.,	distant 2¾ miles.
Mid-channel buoy,* in 19 fathoms between the Heads	N. 28° W.,	distant 1½ miles.
Point Boneta Light-house and Siren	N. 33° W.,	distant 2½ miles.
Mile Rocks	N. ¼ E.,	distant 1 mile.
Lime Point Fog-whistle	N. 16° E.,	distant 3⅞ miles.

In early Spanish charts this point was called Punta del Angel de la Guarda, a name first applied to Pillar Point. In more recent charts it is named Punta de los Lobos.

POINT BONETA.

This is the "Northern Head" of the entrance to San Francisco Bay. It is the southwest pointed extremity of the Tamalpais Peninsula. The outer point is a black, sharp, narrow, precipitous, rocky cliff, one hundred feet above the sea, irregularly increasing in height along the seaward face of the cliffs to the old light-house tower, where it is three hundred feet in elevation. One mile north it sinks to the sea level at the depression of the Rodeo Laguna, whilst towards the Golden Gate it rises higher in irregular rounding summits.

When seen from the outer part of the bar it is projected against the higher land rising from Point Diablo, and only distinguishable by the Light-house, buildings, etc. From the northwestward it shows as a point with three heads, of which the southernmost has been cut down to form the foundation for the new Light-house. During the dry season the deposit of sea birds accumulates in such quantities on the outer edge of the cliffs as to make the steep face show white; but the first heavy rain carries it off, and then through the rainy season the point exhibits its natural color and appearance.

The narrow ridge forming the extremity of the point has two arms with precipitous faces seaward and eastward.

A vessel entering the Golden Gate in the early morning will see the very black western faces of the three bold cliffs of Boneta ranged quartering when bearing north by west (N. by W.). The most distant one stands out farthest. From the top of the seaward face the surface of each falls away to the eastward, so that the crest-line appearance is striking. On the middle and highest stands the old light-house tower, showing white. Behind them, about two miles distant, is a high rounding hill of one thousand feet elevation, with the deep valley of the Rodeo Lagoon between. Apparently from the face of the northwestern cliff a nearly horizontal table of rock, half as high as the cliff, projects well out with a broken front, outside of which is another moderately large, rocky projection with black base and white top. This rocky projection lies five eighths of a mile northwest from the new Light-house. In this position the present Light house will be on the inner slope of the southeastern cliff and less than half as high above the water. As a vessel comes between the Heads the faces of the cliffs come very nearly in line; the new Light-house and its level bench shows just outside the furthest cliff, and the white-topped projecting rock appears to be shut in by it.

In the afternoon, with the sun shining on the western faces of the cliffs, they are comparatively conspicuous except from certain directions.

There are no known dangers far off this point, the line of three fathoms rarely extending two hundred and fifty yards from any part of it; but some detached rocks are seen within this line. The bottom increases rapidly, and from five to six fathoms can be found on all sides of the point. The chart shows a sunken rock in the Boneta Channel one-eighth of a mile broad off the western point, southwest half south (SW. ½ S.) four hundred and sixty yards from the old light house. There was deep water all around it and is reported visible in the hollow of the swell at the time.

When the clipper ship *San Francisco* was lost on this head, we are told that she first struck the cliff inside the head, was carried by the currents around the point, and then stranded outside. The reef, or line of sunken rocks, represented as stretching out three quarters of

* Removed by Light-house Board in September, 1884.

a mile upon some charts,* has no existence and only serves to mislead those unacquainted with the locality.

POINT BONETA LIGHT-HOUSE.

The old light house, which was six hundred yards northwestward from the extremity of the point on the third head, and about three hundred feet above the sea, has been abandoned, and a *new Light-house*, which will more frequently show below the under surface of many of the fogs, has been built two hundred feet lower and near the southwest extremity of the point. The old tower has been preserved and is painted white to serve as a day beacon.

The crest of the southwest extremity of Point Boneta has been cut down to give surface sufficient for the new Light-house building, and the southeast arm has also been cut down to accommodate the steam fog signal house. The light-house building is a low, square brick tower, painted white, rising from the center of the one-story dwelling. The circular balustrade and dome are painted red. From seaward it is seen projected against the dark, high hills behind it, and in clear weather it is a moderately plain object; the old tower is, however, a much better day object.

The illuminating apparatus is of the second order of the system of Fresnel, was first exhibited in its new position February, 1877, and shows *a fixed white light* from sunset to sunrise.

The limits of the arc of visibility are from northwest by west half west (NW. by W. ½ W.), round by the south and east, to northeast by east half east (NE. by E. ½ E.).

The base of the tower is one hundred and three feet above the mean level of the sea, and the focal plane is one hundred and twenty-four feet above the sea, so that the Light should be seen in favorable conditions of the atmosphere from a height of—

10 feet at a distance of	16.4 miles.
20 feet at a distance of	17.9 miles.
30 feet at a distance of	19.1 miles.
60 feet at a distance of	21.7 miles.

The geographical position of the Light, as determined by the Coast and Geodetic Survey, is

Latitude	37° 48′ 51″ north †
Longitude	122° 31′ 47″ west (1877
Or, in time	8h 10m 07s.1

The magnetic variation was 16° 34′ east January 1, 1885, with a yearly increase of 0′.3.‡

The fog-signal building is distant from the Light house ninety yards in a northeasterly direction.

From the Light the bearings and distances to prominent objects are as follows:

Duxbury Reef Buoy, in 12 fathoms	N.	87° W.	8 miles.
Point Reyes Light-house	N.	82° W.	25¼ miles.
Noonday Rock and Buoy	S.	70° W.	29½ miles.
Southeast Farallon Light-house	S.	56° W.	23¾ miles.
Point San Pedro	S.	18° E.	13¼ miles.
Point Montara Fog-whistle	S.	18° E.	16¼ miles.
Buoy No. 3, in 6 fathoms, on east end of Four-fathom Bank	S.	66° W.	½ mile.
Buoy No. 1, in 6½ fathoms, off west end of Four-fathom Bank	S.	66° W.	4¼ miles.
Whistling Buoy, outside the bar in 15 fathoms	S.	45° W.	6¼ miles.
Inside Bar Buoy, in 9½ fathoms	S.	31° W.	2⅝ miles.
Mid-channel Buoy, between the Heads	S.	35° E.	1¼ miles.
Point Diablo, north side Golden Gate	N.	63° E.	1¼ miles.
Alcatraz Island Light-house and Bell	N.	66° E.	5¼ miles.
Fort Point Light-house and Bell	N.	80° E.	2¼ miles.
Seal Rocks, off Point Lobos	S.	33° E.	2¼ miles.

FOG SIGNAL AT POINT BONETA.

The house containing the fog signal is a white building on the southeastern arm of the point of Point Boneta, where the surface of the rock has been cut down to ninety seven feet above the sea. The building is ninety yards northeastwardly from the Light-house.

* See description of San Francisco Bay and approaches, pages 170, 171.

† *Magnetic Variation, San Francisco.*—The present increase of the variation is 0′.3 annually. It is decreasing, and the eastern variation will attain its maximum limit of 15° 36′ about the year 1890, and begin to slowly decrease.

‡ Removed by direction of the Light-house Board, September, 1884.

The apparatus is a steam fog-syren of the first class (with duplicate in case of accidents), sounding trumpet blasts during thick and foggy weather, night or day, *every thirty-nine seconds;* the *blasts* are *four seconds long* and the *intervals thirty-five seconds.*

The fog-signal at Point Boneta is frequently heard distinctly at the whistling buoy off the bar, and even as far down as Point San Pedro.

In passing around Point Boneta, within three or four hundred yards, to go out through the Boneta channel in a thick fog, we noticed that the signal comes sharp and shrill like a reed instrument. It has no "siss" after it. This characteristic differs wholly from the roaring blast of the same Point signal. In coming in from the seaward we hear the Lime Point signal before being up with Point Boneta.

For the bearings of prominent objects see description of the Boneta Light-house.)

The fog-gun at Point Boneta was discontinued March 18, 1858; the fog-bell which displaced it was discontinued May 29, 1872, when the steam fog-horn was adopted.

Point Boneta is called Punta Boneto on old English charts; Punta Boneta, by Beechey; Punta Boneta, by Ringgold, 1851, and Point Bonita on the present U. S. Coast Survey charts, but on the old charts Point Boneta. The more probable designation is Bonete, being the Spanish word for a bishops' cap; for the point presented the appearance of three such heads when seen from the westward.

THE SOUTH SHORES OF THE GOLDEN GATE.

From Point Lobos the general trend of the shore is in a line towards Fort Point for three-quarters of a mile to a short, jutting, high point, immediately under which lie numerous rocks above water, with the Mile Rocks one-third of a mile off it. From this inner point (Mile Rock Point) the high, rocky shore runs well to the eastward for a mile, and then gradually trends to the south for a mile and a half to Fort Point. In the deepest part of this bend there is a long sandy beach backed by small hillocks rising from the general surface and slope of the hills. The land behind the shore to Fort Point rises to nearly four hundred feet elevation and then declines to the Fort. The crest-line towards the point is surmounted by a chain of earthworks with heavy guns.

Vessels are sometimes compelled to anchor in the bight between Point Lobos and Fort Point to avoid being carried on the Mile Rocks when the wind gives out on the ebb tide, but it is not a pleasant anchorage and difficult to get under way from. When the wind springs up it blows home on the beach, and when the current is not running strong ebb there is always considerable sea setting in there. Vessels should not anchor there except in cases of absolute necessity. The depth of water in this bight is ten to thirteen fathoms on the line between Point Lobos and Fort Point, decreasing to four fathoms two hundred and fifty yards off the beach; bottom sandy and rocky.

THE MILE ROCKS.

These two small black rocks lie five-sixths of a mile north eight degrees east (N. 8° E.) from the Seal Rock off the western extremity of Point Lobos; and a short distance within the line of the entrance to the Golden Gate. They lie just one third of a mile northwest half west (NW. ½ W.) from the sharp, jutting point, one hundred and sixty feet high, first inside and on the shore of Point Lobos Head, and very nearly two miles southwest half south (SW. ½ S.) from Fort Point. They bear almost southeast (SE.) one and two-thirds miles from Point Boneta Light. Vessels running in on the range of Fort Point and Alcatraz Lights pass half a mile to the southward of the outer and larger rock with twenty-two fathoms of water.

The rocks are about twenty feet above high water, and are separated by barely one hundred yards. They are reported to have sufficient water between them to carry a vessel through if an extraordinary exigency demanded such a risk; it is asserted that a deep-sea ship has drifted out between them.

The examination of the passage inside of Mile Rocks (1884) has so far developed a sunken rock with feet of water upon it lying south eighty-six degrees east (S. 86° E.), one hundred and seventy-six yards from the Outer Mile Rock. This puts it on the range with the northern part of the Outer Rock, and seventy-six yards distant from it. Twenty two yards to the northwestward of this rock lies another with fourteen feet of water upon it. Under the shore for a distance of one hundred yards abreast of the Mile Rocks lie several large rocks; the two larger ones are

from thirty-five to forty-one feet above water, and lie from one hundred and seventy-five to two hundred and twenty-five yards from the shore line. Close alongside these inshore rocks there is five fathoms of water, and deep water inside of them, with many smaller and sunken rocks upon which a moderate swell breaks. The two principal rocks of the inshore group are twenty yards in extent; and fifty yards outside of the line joining them, and halfway between them, lies a sunken rock with five feet of water upon it.

These dangers thus contract the passage between the Mile Rocks and the nearest point to three hundred and fifty yards. The soundings inside of the Mile Rocks generally indicate from six and a half to ten and a half fathoms of water, but the pilots affirm that the steamer *Panama*, drawing eighteen feet of water, struck on a sunken rock in this passage, and since that occurrence they never take a ship through it. The recent examination showed a four and a half fathom rock nearly in mid-passage, but as the survey was not exhaustive and there may be other bayonet points in it, it is hazardous for vessels to go through this passage. Deep vessels should not attempt it.

We have the following bearings and distances from the Outer Mile Rock:

North Seal Rock, off Point Lobos	S. S	W.	⅜ mile.
First large rock inshore, 35 feet high	S. 16	E.	650 yards.
4½ fathom rock in the passage	S. 31	E.	325 yards.
5 feet sunken rock, 55 yards outside visible rocks	S. 31	E.	485 yards.
6 feet sunken rock, off Inner Mile Rock	S. 86	E.	130 yards.

These rocks were named the "One Mile Rocks" by Beechey in November, 1826.

FORT POINT.

Within the "Heads" the southern shore of the Golden Gate changes its easterly [illegible] when one and a half miles inside of Point Lobos, and from the southern extremity of [illegible] shore runs nearly north for a mile and a half to Fort Point. Within three quarters of [illegible] the point, in this stretch, the shore is very bold and rocky, and several rocks lie off it, none, however, farther than one hundred and seventy yards from high-water mark.

Fort Point bears northeast by north one-quarter north (NE. by N. ¼ N.), two and two-thirds miles from the North Seal Rock off Point Lobos, and north eighty degrees east (N. 80° E.), two and a half miles from Point Boneta Light. It was formerly a bold, narrow, jutting promontory of hard serpentine rock, one hundred and seven feet above high water, and surmounted by a small Mexican battery mounting six guns, called Fort Blanco.* The view from the point was one of the finest in the harbor; but the whole headland has been cut down to within a few feet of high water, and increased in area to form the foundation for a large red brick fortification, upon the northwest bastion of which is erected the Light-house. This fort is now the marked feature of the point. Along the top of the bluff on the western or seaward shore are the earth batteries for the defense of the entrance. On the rise of the hill from the eastern or bay shore are the officers' and soldiers' quarters, houses of the employés, etc. About one third of a mile eastward of the point is a long, substantial wharf constructed for receiving stores, ordnance, etc. It is known as Fort Point Wharf. In 1886 this wharf was entirely destroyed.

Close off the point lies a sunken rock upon which the ship *Samoset* struck and was wrecked. Several large vessels have been lost on or near the point by venturing too close during [illegible] with the strong, irregular currents which sweep past here with a velocity reaching six miles per hour.

FORT POINT LIGHT HOUSE.

This is a white tower with a red dome to the lantern. It is situated on the northwest bastion of the fort, and rises twenty-seven feet above the parapet. The keepers' dwellings are situated on the bluff two hundred feet in the rear of the tower, and consist of two buff-colored cottages with red trimmings and green shutters. The illuminating apparatus is of the fourth order Fresnel, and shows from sunset to sunrise a *fixed white light varied by four consecutive [illegible] flashes.* By observation we found the time of recurrence of signals to range from one minute and forty-one seconds (1882) to one minute and fifty-three seconds (1885); in the latter case the white light showed fifty-five seconds, interval of darkness seven seconds, red flash two and four [illegible] seconds, darkness eleven seconds, red flash two and four-fifths seconds, darkness eleven seconds [illegible]

* A view of it as described was given on the U. S. Coast Survey charts of the coast, edition

two and four-fifths seconds, darkness eleven seconds, red flash two and four-fifths seconds, darkness six seconds, and then the white light of fifty-five seconds, etc. This characteristic Light has been shown since May 1, 1878.

The focal plane of the Light is eighty-three feet above the level of the sea, and during favorable states of the atmosphere it can be seen from an elevation of fifteen feet at a distance of fifteen miles. The Light shows through the whole horizon, but the range of visibility seaward is bounded by the extremity of Point Boneta, bearing west three-quarters south (W. ¾ S.), and Point Lobos, bearing southwest by south one-quarter south (SW. by S. ¼ S.).

The geographical position, as determined by the triangulation of the Coast and Geodetic Survey, is:

Latitude	37° 48′ 32″ north.	1877.
Longitude	122° 28′ 39″ west.	
Or, in time	8h 09m 54s.6.	

The magnetic variation, January, 1885, was 16° 34′ east, and increasing 0′.3 annually.

The Southeast Farallon Light is just visible from a vessel's deck when abreast of Fort Point.

From Fort Point Light we have the following bearings and distances to prominent objects:

Northwest Seal Rock, off Point Lobos	S. 30° W.	2¼ miles.
Whistling Buoy, off the Bar, in 15 fathoms	S. 54° W.	10 miles.
Southeast Farallon Light-house	S. 58° W.	25¼ miles.
Point Boneta Light-house	S. 80° W	2¼ miles.
Lime Point Fog-whistle	N. 22° W.	¼ mile.
Alcatraz Island Light-house	N. 54° E.	2½ miles.
Black Point	N. 76° E.	2½ miles.
Yerba Buena Island Light-house	N. 75° E.	5½ miles.

FOG BELL AT FORT POINT.

The iron frame-work supporting the bell is on the west face of the northwest bastion of the fort, below the parapet. The machinery for tripping the hammer of the bell is on the south face of the same bastion. The base of the bell is forty and a half feet above the mean level of the sea. The bell weighs one thousand and ninety-two pounds, and during foggy or thick weather, night and day, is struck by machinery, giving blows at intervals of ten seconds.

Sometimes this bell can not be heard at all with westerly winds; at other times it is heard only when a vessel is close upon the Fort Point Ledge Buoy, although it may sound loudly when to the east of it. Since the establishment of the Lime Point Fog whistle vessels depend almost wholly upon the whistle, and generally keep more on that side.

In passing out through the Golden Gate in a thick fog we could not hear the fog-bell until we were abreast of it; and then it did not sound clear, but as if the hammer fell on the bell after the first stroke.

Fort Point.—A *mammoth nun-buoy*, painted *red* and numbered 2, has been substituted for the first can buoy on the channel edge of Fort Point Ledge.

The buoy has been anchored in eight fathoms of water with a comparatively short scope of chain and with a very heavy anchor.

The buoy bears north fifty-two and a half degrees west (NW. ¾ W.) three hundred and eighty-seven yards from the light house on the fort; and three hundred and twenty-six yards from the seawall under the fort.

It should be given a good berth, for the ebb current along the south shore, struggling with the eddy currents from the Raccoon Strait and north of Alcatraz, sweeps in on the ledge with great and irregular force. (See description of Fort Point Ledge, page 185.)

In passing out through the Golden Gate in a thick fog we saw the red buoy off Fort Point. The outline of sea-wall around the fort was visible, but the fort itself was hidden in the fog.

Fort Point was known on the old Spanish charts as Punta del Cantil Blanco. In 1850 it was called Punta del Castillo in one of the U. S. official documents.

Kotzebue says that one of the features of the entrance to San Francisco Bay was the fortress on Punta del Cantil Blanco on a high rock named after St. Joachim.

THE NORTH SHORE OF THE GOLDEN GATE.

The general direction of the north shore from Point Boneta to Lime Point is northeast by north half north (NE. by N. ½ N.), two and a half miles.

Point Boneta.—This point and the light and fog-siren have been fully described on pages 174 and 175.

POINT DIABLO.

This point within the "Heads" lies northeast by east two-thirds east (NE. by E. ⅔ E.), one and a half miles from Point Boneta. Inside of Point Boneta the high rocky shore retreats more than half a mile to the northward and then runs nearly east one mile to Point Diablo. This point is a very narrow and precipitous headland two hundred and four feet high, and stands out one-eighth of a mile square into the Golden Gate, with deep water on its three sides. The outline of the point is almost level for a distance of two hundred and sixty yards from the extreme point, but it has two slight notches in it. The outer one is sixty feet below the level of the point; the inner side of this is a somewhat broken line to the second notch which is about forty or fifty feet deep. Then the high, narrow, grassy ridge rises rapidly in five heads to the northward, and in one mile reaches nine hundred and sixty feet elevation. There is a narrow sand-beach north of the head and extending one quarter of a mile to the eastward of the neck. The old Boneta Light-tower in range with the extreme point of Point Diablo is the back-range for crossing the Presidio Shoal in the best water.

The currents run with violence and irregularity past Point Diablo, and a vessel close under this and the other high projecting points may lose the wind when it is light in summer.

In the vicinity of Point Diablo the face of the cliffs is of a reddish-purple color. The rock is very hard and flinty; it is traversed by seams of quartz, and has a banded or belted structure, so that it resembles varieties of jasper. It exhibits its stratified character most distinctly. The red specks found on the inner side of the bar are probably derived form the disintegration of these reddish cliffs.

From Point Diablo we have the following bearings and distances to prominent objects:

Point Boneta Light	S. 65°	W.	1¼ miles.
North Seal Rock, off Point Lobos	S. 4°	W.	2¼ miles
Fort Point Light	S. 78°	E.	1⅝ miles
Lime Point Fog-whistle	N. 54°	E.	¼ mile.
Alcatraz Island Light	N. 6°	E.	3¾ miles
Presidio Shoal Buoy	N. 83°	E.	2¼ miles
Electric Light (private) on Telegraph Hill	N. 86°	E.	4½ miles.

Boneta Cove.—This is the small bight inside the "Heads" between Point Boneta and Point Diablo, but the name is generally restricted to the anchorage close under the eastern shore of Point Boneta. There is a depth of three fathoms from one hundred to two hundred and fifty yards from the shore, very gradually increasing to eight and ten fathoms towards Point Diablo; but a rock with only seventeen feet of water upon it has been found about five hundred and fifty yards north-northeast (NNE.) from the steam fog-siren. On the line from the Light-house to the neck of Point Diablo the depth ranges from eight to fourteen fathoms; and inside of the line it is less.

A good anchorage in seven and a half fathoms can be had on the ranges of the north end of Alcatraz Island just shut in behind Point Diablo, and the Ocean Side House on the inner edge of the Seal Rocks off Point Lobos. Pilots report lying in this cove, close under the beach, in heavy southeast weather. There is no mooring buoy here except a small one immediately off the landing platform for the Light house, and this is used to make fast to when the sea is so rough that it is necessary to keep the boat off the rocks.

The San Francisco pilot boats use this cove for anchorage, and coasting schooners [illegible] here when waiting for a wind. At several places in the bight there is a short, narrow [illegible] beach at low water at the foot of the cliffs. This anchorage is sometimes known [illegible]

LIME POINT.

From Point Diablo to Lime Point the shore line continues nearly in the same general direction as from Point Boneta, but the shores are bolder and more precipitous, and the indentation is very slight. From Point Diablo to the eastern rock off Lime Point the bearing is north fifty-four degrees east (N. 54° E.), and the distance one mile. Half way between the two points [illegible]

low, flat piece of land, now fronted by a water battery of heavy guns, abreast of which the three-fathom curve is three hundred yards off shore.

Lime Point is high and precipitous, with the immediate face blasted away preparatory to purposes of defense; the height directly behind it rises to four hundred and eighty feet. Two rocks lie close under its southern face within the three-fathom curve, but they are now connected with the point by the loose rocks thrown down by the blasting operations. The eastern face of the point runs north-northwest (NNW.) for half a mile to Horse-shoe Cove. Four hundred and [illegible] yards from the point in this stretch are some high rocks close ashore called "The Needles."* The top of one of these from certain directions resembles a man's head. There is deep water close outside of them.

The narrowest part of the Golden Gate lies between Lime Point and Fort Point, which bears south twenty degrees east (S. 20° E.), distant seven-eighths of a mile. The *currents* set by Lime Point very strongly and very irregularly, as the ebb waters passing out of the northern part of San Francisco Bay through Raccoon Strait here struggle with the ebb waters coming from the southern part of the bay.

FOG-SIGNAL AT LIME POINT.

In 1883 a steam fog-signal was located on what was formerly the eastern and most projecting rock off Lime Point. This rock is about forty feet wide and two hundred and twenty-five feet long and was over forty feet high, but the summit has been blasted down to a height of twenty feet. The fog-signal house is a one-story brick structure on the southern extremity of the rock, eighteen feet above high-water mark. The keeper's dwelling, also a brick structure, two stories in height, is erected immediately behind it, twenty feet above high-water mark. Both buildings are painted white. The apparatus is a twelve-inch steam-whistle, of which the characteristic signal consists of *ten seconds with intervals* of *thirty seconds.*

Some shipmasters report that there are certain positions in the approach to the Golden Gate where they lose the sound of this fog-whistle; notably about the vicinity of the Mile Rocks, and at a distance thence to Fort Point. It is heard, however, well to the southward of the Seal Rocks. This peculiarity has not been verified.

In passing this point to seaward in thick weather we noticed that the signal was markedly a [illegible] and not sharp and reed-like as we hear the Boneta signal when close to it. We did not hear the Boneta signal until we were past Lime Point.

The geographical position of Lime Point Fog-whistle has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	37	49	26	north.
Longitude	122	28	43	west.
Origin [illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Magnetic variation, January, 1885, was 16° 34′ east, and increasing 0′.3 annually.

For directions for passing through the Golden Gate and the peculiarities of the Lime Point [illegible] see Sailing Directions.

From Lime Point Fog-whistle we have the following bearings and distances:

Point Diablo	S. 54 W.	1	mile.
Outer (north) Seal Rock, off Point Lobos	S. 18 W.	3¼	miles.
Fort Point Light-house	S. 20 E.	¾	mile.
Presidio Shoal Buoy	S. 76 E.	1⅝	miles.
Alcatraz Island Light-house	N. 73 E.	2¼	miles.
Yerba Buena Island Light-house	N. 86 E.	5¼	miles.
Electric Light (private) on Telegraph Hill	S. 85 E.	3⅝	miles.
Point Cavallo and the West Point Angel Island in range	N. 20 E.	¼ and 2⅜	miles.

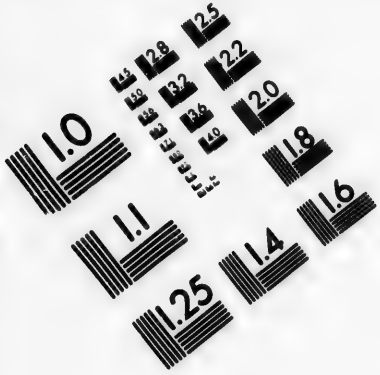
Lime Point was known on the old Spanish maps as Punta de Santiago. Beechey named it in 1826 and applied the name Lime Point Bluff to the high, sharp point one-quarter of a mile west of Lime Point. It was named Lime Rock by Ringgold in 1850.

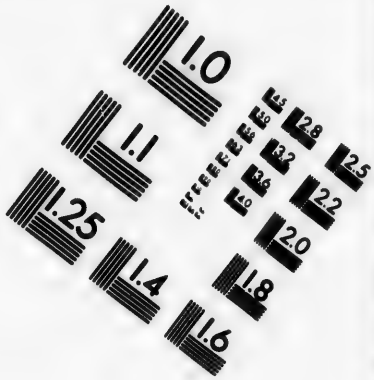
THE SHORES AND ISLANDS IN THE BAY OF SAN FRANCISCO.

When a vessel has passed in between Fort Point and Lime Point she is considered to be fairly within the Bay of San Francisco; and the description of the shores is continued as follows:

Point Cavallo.—This comparatively low, but steep, sharp point lies north twenty degrees east (N. 20° E.) distant half a mile from Lime Point, and is the first point on the north side of the

*Named by Beechey, 1826.





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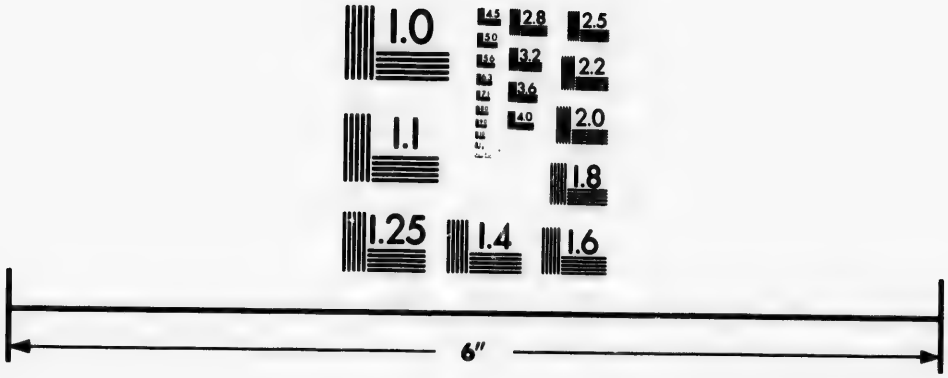

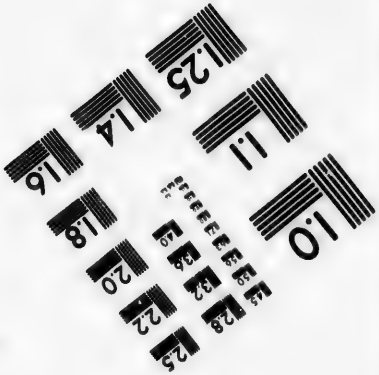

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Bay of San Francisco within the Golden Gate. It is eighty feet above the sea; it points towards the south-southeast (S. SE.), and its eastern shore runs north, a little over one-quarter of a mile, to Yellow Bluff.

Between Point Cavallo and Lime Point lies the contracted, shoal boat-landing of *Horseshoe Cove*, with only six feet of water two hundred and fifty yards from the beach and three fathoms at nearly half a mile. Behind the sand beach of the cove the land is low and marshy for a short distance, then rising sharply to the mountains behind. On the western side of this cove, a little over one-quarter of a mile north by west (N. by W.) from Lime Point, stand the two sharp-pointed rocks called "The Needles," already referred to. They are now connected with the mainland by the débris from the blasting operations on the east side of Lime Point. A depth of three fathoms of water is found close outside of them.

From Point Cavallo, Raccoon Strait lies broad open to the north-northeast, with Angel Island on the east and Peninsula Point on the west. The latter bears from Point Cavallo north half east (N. ½ E.), and is distant one and seven eighths miles. The broad and deep indentation lying to the northwestward of Peninsula Point is known as Richardson's Bay. It is quite shallow, having only one fathom at low water half a mile inside of Peninsula Point and Saucelito.

The ebb currents set by Point Cavallo with great force, and are somewhat irregular on account of the directions of the out rushing waters from Raccoon Strait and south of Angel Island.

On recent Spanish charts Point Cavallo, with Yellow Bluff, which is really a part of it, was known as the Punta de los Cavallos; and on the old Spanish charts as the Punta de San Carlos.

Yellow Bluff lies six hundred yards north from Point Cavallo; it is precipitous and the hill behind it is one hundred and eighty feet above the sea. There is a sunken rock with six feet of water upon it close under the cliffs about one hundred and twenty yards east from the northeastern extremity of the point. A depth of four fathoms is found two hundred yards outside this sunken rock to the east-northeast, and then the bottom drops suddenly to twenty fathoms. The remarks about the currents off Point Cavallo apply with equal force to this point.

The name is derived from the appearance of the bluff, which is really the eastern face of Point Cavallo. Earth-work defenses are being constructed on this point, and the face of the bluff is partially changed by the slopes of earth, etc.

SAUCELITO COVE.

From Yellow Bluff the shore trends northwest by north (NW. by N.) one and one-quarter miles to the wharves of Saucelito. Midway on that line, under the steep and partially wooded shore, is the permanent tidal station of the U. S. Coast and Geodetic Survey. Seven-eighths of a mile from Yellow Bluff is the beautiful little cove of Saucelito, the present rendezvous of the yacht fleets of San Francisco, and the old anchorage of the foreign and American men-of-war and the whaling fleet. To-day it is the rendezvous of part of the wheat fleet. There is anchorage from four to ten fathoms with good holding ground, and with the advantage of lying to the southwestward of the strong currents running through the Raccoon Strait and past Yellow Bluff and Lime Point. The fogs cover this cove much later than the surrounding shores. The [illegible] road around the shore and numerous beautiful villas clustering on the sloping hillsides. Saucelito is now the southern terminus of the narrow-gauge North Pacific Coast Railroad [illegible] San Rafael, Tomales Bay, Bodega Bay, and the Russian River. From Saucelito was formerly derived the principal water supply of San Francisco, especially for the shipping. To the northward of Saucelito lies the before-mentioned Richardson's Bay.

On the old Spanish charts this cove was known as the "Ensenada del Consolacion." It was named Sausalito (little willow) by Beechey in 1826. On the present charts the name is spelled Saucelito.

The description of Raccoon Strait and Angel Island will be given further on among [illegible] in the bay.

On the *south side of the bay* the first point inside of Fort Point is Presidio Point.

Presidio Point.—One and one-third miles east of Fort Point the shore presents a [illegible] rounding point nearly abreast of the Anita Rock Spindle. It is a bare sand beach [illegible] broken by the Presidio Wharf and others, and well marked by the houses and trees on its north face. Between this point and Fort Point, the low shore retreats over a quarter of a mile southward of the line joining the two; and between it and Black Point, the low shore falls back to the south about one-third of a mile to the mouth of a slough which drains all the low lands behind the

point. A depth of three fathoms is found one hundred and ten yards off the beach inside the Anita Rock Spindle.

The currents are not so strong immediately along this point as they are outside or to the northward of the Anita Rock, which lies less than three hundred yards from the point and is marked with a spindle. (For description of Anita Rock see Dangers in the Bay of San Francisco, page 186.)

It is a curious and interesting fact that the sand beach between Fort Point and Point San José has been thrown [illegible] the surf upon an extensive alluvial deposit, which has the character of a peat bog or swamp. When the tide [illegible]w, the edge of this peat formation may be seen. Large masses of the peat are also broken out during storms, [illegible]wn upon the sand of the beach. This sand and all the loose round bowlders, from three to eight inches or more in diameter, rest upon a foundation of the peat; and the continuation of the same substance is found in the swamp or that meadow land which lies inside the belt of sand and between it and the base of the sandstone hills. It [illegible]fficient to account for the formation of this swamp under conditions like those at present existing. A strong [illegible] is constantly setting back and forth through the channel, and the action of the surf constantly undermines and encroaches upon the beach, so that the present action is destructive, and the swamp could not possibly have been formed while the Golden Gate was open as we now find it.*

The shore-line is now protected from abrasion by the wharves; and it will be wholly changed and carried out to the three-fathom curve by the great thoroughfare projected around the city front by the State Board of Harbor Commissioners.

Black Point or Point San José.—This is a small but bold and rocky point, standing out nearly one quarter of a mile, and lying two and one-third miles north seventy seven degrees east (N. 77° E.) from Fort Point, one mile south of Alcatraz Island, and three-quarters of a mile west-southwest (W. SW.) from North Point. From Black Point the summit of Yerba Buena Island shows just inside North Point. The point rises a little over one hundred feet above the water with a slight depression behind it. It is covered with houses, trees, and shrubbery, and has guns in position around it. A tall flag staff surmounts the point. There is a small wharf on the northeast side, used only for military purposes, and a roadway leading to it winds round the face of the point. Behind this point is a large area of sand dunes which have been formed by the drift of the sand from the western beach. Under the eastern part of the point lie several very large brick buildings used for factories, in the vicinity of which are located three or four low electric lights showing plainly, and almost glaringly, from the water. In coming from seaward in dark, clear nights the position of Black Point can be readily made out by the comparative absence of lights upon it, whilst above it, and on either side of it, especially to the eastward, are seen the bright lights of the city.

The depth of water immediately under the point is four and a quarter fathoms, occasioned by the scour of the currents; but this depth is only in a blind channel because it shoals to fifteen feet to the westward. The general three fathom curve is three hundred and twenty-five yards to the north of the point.

From Black Point we give the following bearings and distances to important objects:

Fort Point Light-house	S. 77	W.	2¾ miles.
Anita Rock Spindle	S. 73½	W.	1¼ miles.
Presidio Shoal Buoy	S. 89	W.	1 5/6 miles.
Alcatraz Island Light-house	N. 3°	W.	1 1/10 miles.
North Point (western extremity of sea-wall)	N. 70	E.	¾ mile.

North Point.—This was formerly the northwest point of Telegraph Hill and formed the northeastern extremity of the city of San Francisco. The present North Point is an artificial shore, formed by the western extremity of the sea-wall which is being built around the city, and will eventually be connected in a direct line with Black Point. Upon the present part are erected very extensive wooden warehouses for the storage of freight received from, or going into the the ships lying along the sea-wall.

It lies two-thirds of a mile east-northeast (E. NE.) from Black Point; three and one-eighth miles east by north one-quarter north (E. by N. ¼ N.) from Fort Point; and one mile southeast one-quarter south (SE. ¼ S.) from southeast point of Alcatraz Island. It is half a mile northwest by west (NW. by W.) from the summit of Telegraph Hill, which rises up very sharply at one-quarter of a mile inside the sea-wall to three hundred and one feet above the water, with very steep face to the northeast.

*U. S. Coast Survey Report for 1855, p. 389; report of Prof. W. P. Blake on the Geology of the Coast of California.

Four fathoms of water may be had alongside the sea-wall; and eight fathoms in the channel way half way to the Blossom Rock Buoy. The currents are quite strong around this point.

From North Point, the western extremity of the present sea-wall, we have the following bearings and distances to important objects:

Black Point	S. 70	W.	¾ mile.
Alcatraz Island Light-house	N. 40	W.	1¼ miles
Blossom Rock buoy, in four fathoms	N. 22	E.	¾ mile
Yerba Buena Light-house	N. 75½	E.	22 miles

There are (December, 1884) two spar-buoys placed off the western end of the sea wall. They do not mark dangers, but are used for breast-moorings by small vessels discharging into wood at the wharf.

The marine reporter for the Merchants' Exchange, the United States revenue boarding officer, and the quarantine officers of the port, have their offices on the western extremity of the sea wall.

Telegraph Hill has been partially described on page 171. The east shore of the hill was formerly called Clark's Point. The electric light upon a high mast on the summit of the hill is four hundred feet above the bay. It shows over the immediate waters and is of great service therein. It also shows out to seaward in several directions, fully described in the advice to vessels approaching the bar of San Francisco, page 214.

ALCATRAZ ISLAND.

This is the first island that is opened when a vessel enters the Golden Gate, and upon it have been constructed extensive fortifications and a Light-house.

The island is small, moderately high, and because it stands broad in the line of the channel, it is a capital mark by day and night. It is about six hundred yards long in a west-northwest and east-southeast direction, by about two hundred and sixty yards in breadth, and rises to an elevation of one hundred and thirty-seven feet above the bay. It is surmounted by a cluster of brick buildings and the Light-house. The surface and outline have been greatly changed and the artificial, steep, sloping sides with vertical rocky shore in places, together with the lines of guns, present a very formidable defensive appearance. The earth formerly covering the rocky islet has been removed and used on the sides; but the island itself is a mass of fine grained and very compact sandstone of a dark bluish color. Deep water-markings exist upon all the rocky projections. At the northeast side a small pier has been built to receive stores, ordnance, etc. Deep water exists all around the island except at the northwest point, where foul bottom makes out three or four hundred yards, and is in fact part of the long sub-surface ridge hence to the Presidio Shoal.

ALCATRAZ ISLAND LIGHT-HOUSE.

This Light-house is built on the summit of the island about one hundred and ninety yards from the southeast point. It is a circular white tower rising from the white dwelling; the dome of the lantern is painted red. The illuminating apparatus is of the third order of Fresnel, illuminates the entire horizon, and exhibits from sunset to sunrise *a fixed white light*. The height of the focal plane above the base is thirty-six feet, and one hundred and sixty-six feet above the surface of the bay; it should be seen from a ship's deck under ordinary states of the atmosphere at a distance of fourteen miles, or outside the bar of San Francisco.

Its geographical position, as determined by the Coast and Geodetic Survey, is

Latitude	37	49	30	north
Longitude	122	25	18	west
Or, in time	8	09	45.2	

In January, 1885, the magnetic variation was 16° 34′ east, with a yearly increase [illegible].

From Alcatraz Island Light we have the following bearings and distances to prominent points in the bay:

Fort Point Light-house	S. 54	W.	2¼ miles
Point Boneta Light-house	S. 67	W.	5 miles
Lime Point Fog-whistle	S. 72	W.	2¾ miles
Southeast point of Angel Island	N. 9½	W.	1¾ miles
Black Point	S. 4	E.	1¼ miles
Blossom Rock Buoy	S. 79	E.	1 mile
Arch or Bird Rock	S. 83	W.	[illegible] miles
Shag Rock	N. 78	W.	1 miles

FOG-BELL ON ALCATRAZ ISLAND.

The frame-work supporting the bell is built on the southeastern extremity of the island, one hundred and ninety yards from the Light-house, close to the water's edge, and is elevated about thirty feet above the water. The bell weighs one thousand and ninety-two pounds, and during foggy or thick weather is struck by machinery *five blows with four intervals of ten seconds and the last blow followed by an interval of twenty-five seconds*, as follows: Blow, interval ten seconds; blow, interval ten seconds; blow, interval ten seconds; blow, interval ten seconds; blow, interval twenty-five seconds. Blossom Rock lies one mile east by south (E. by S.) from the Fog-bell.

In the foul ground two hundred yards southwest from the western point of Alcatraz Island lies the wreck of the bark *Oliver Cutts*. It is marked with a *green buoy*, and is more fully described under the head of Dangers, page 189.

Alcatraz is the Spanish name of the island; Beechey erroneously calls it Alcatrasses. The local name was Bird Island. In early days it was the resort of seals and sea-lions, and was white with the deposit of these animals and of birds.

An old Spanish chart calls this the Ysla de Mal Abrizo.

ANGEL ISLAND.

When passing through the Golden Gate this large, high island bears about north-northeast, and is seen as an island for a very short time when in the narrowest part of the passage. It has an irregular and bold shore-line of about five miles, and an area of one square mile. It rises to a height of seven hundred and seventy-one feet, is covered with grass and bushes, and cut in every direction by deep gullies. As seen from the southeastward it appears part of the northern peninsula, but is divided from that on its northwest face by Raccoon Strait, three-quarters of a mile in width, having a depth of water ranging from ten to thirty fathoms, and a very strong current. Point Blunt,* a narrow, high, jutting head, makes out from the southeast part of the island, bearing north three quarters west (N. ¾ W.), and distant one and five-eighths miles from Alcatraz Island Light. This point has several detached rocks around it, all within the three-fathom line. From this head the general trend of the southern face of the island for over a mile is west by south (W. by S.) toward Saucelito Point. For a quarter of a mile off the rounding and moderately high head called Point Knox, and which is the southwest point of the island, the three-fathom line stretches south one quarter of a mile. Point Stuart* is the extreme western point; it is rocky, narrow, high, and bold, and forms the southeastern point of the entrance to Raccoon Strait. The military post on Angel Island is in the cove on the south side of this point, and faces towards Saucelito Cove.

Deep water is found all around the island close to the shores, except off the southwest point and for two hundred yards off the southeast point.

FOG-BELL ON ANGEL ISLAND.

On the southwestern extremity of Point Knox, which is the southwest head of Angel Island, there are two small, rocky projections about thirty feet high and about two hundred and fifty yards apart. The northwestern of these has been cut down to about twenty feet above the water, and upon the leveled surface there has been erected a small wooden building to contain the fog-bell and the machinery for striking it. The keeper's dwelling is a square, wooden building with pyramidal roof, and is placed immediately behind the fog-signal house. They are all painted white.

The characteristic of this fog signal is that *double blows* on the bell are struck at intervals of *fifteen seconds*. [It has been constructed mainly for the benefit of the ferry traffic between Point Tiburon, in Raccoon Strait, and the city of San Francisco.]

It was put in operation on the 26th of October, 1886.

The geographical position of the fog-signal, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	37	51	15	north.
Longitude	122	26	31	west.
Or, in time	8h	09m	46s.3.	

* Named by Kinggold in 1850.

From this fog-signal we give the following bearings and distances to important points in the bay:

Point Stuart, the western point of Angel Island	N. 55° W.	¼ mile.
Peninsula Point	N. 82° W.	1 mile.
Lime Point Fog-whistle	S. 73° W.	2¼ miles.
Fort Point Light-house and Bell	S. 61° W.	3¾ miles.
Alcatraz Island Light-house and Bell	S. 45° E.	2 miles.

Raccoon Strait lies on the northwest side of Angel Island with a width of not less than [illegible] mile, and has deep water from ten to thirty fathoms over various bottoms and very strong currents. Its general direction is north-northeast and south-southwest (NNE. and SSW.), and the northwest point of entrance is *Peninsula Point* on the main-land. This is a sharp, rocky, and bold point of one hundred and fifty feet elevation, and has six fathoms of water close up to it. The depth reaches thirty-nine fathoms about two hundred yards off Peninsula Point; off Point Tiburon [illegible] fifteen fathoms; and off Bluff Point, the northeast point of entrance, it is ten fathoms. The least depth in the channel is six fathoms off Hospital Cove on Angel Island.

The ebb current sets strongly through Raccoon Strait directly towards Yellow Bluff and thence across towards Fort Point; and the flood-current is felt there earlier than in any other part of the bay west of Alcatraz Island.

Deep laden vessels may readily pass from sea through the strait, or from the upper bay to seaward, although the practice is to take vessels directly to San Francisco. A new terminus of the North Pacific Coast Railroad has been built at Point Tiburon about midway on the northwest side of the strait, and it is intended to load deep-water vessels at this place.

The opening of Raccoon Straits on with the Seal Rocks off Point Lobos is the pilots' track in leaving San Francisco across the southern part of the bar. (See Sailing Directions.)

YERBA BUENA ISLAND.

This is the moderately high, large island opened to the south and beyond Alcatraz [illegible] after entering the Golden Gate. It lies between the north front of San Francisco and the Oakland piers. The western point of the island is one and three-quarters miles northeast by east (NE. by E.) from Telegraph Hill, and two and a half miles east half south (E. ½ S.) from the Light on Alcatraz Island. With steep, irregular sides it reaches an elevation of three hundred and forty feet on the summit of the ridge, which lies nearly east and west. It is covered with coarse grass [illegible] and a few scrubby trees, but the shores near the water are rough and rocky. On the southern or San Francisco side, the water is quite deep close in shore, but from the northwest point a massive shoal, over half a mile wide, stretches one and one-quarter miles to the northwest (NW. by N.). The outline of this shoal is very regular, and the approaches to it steep on every side, but on the northeast side it deepens gradually and has a more irregular outline toward the deep channel on the northeast side of the island. The depth of water on this shoal ranges from six to eighteen feet, the least water being near the northeast point of the island. There is also a shoal making out southeastward from the southeast, or light house, point of the island for two hundred and twenty yards. The least water on it is fifteen feet, and it has a pocket of deep water [illegible] fathoms and over, inside of it and close under this point of the island. The line of four fathoms is nearly half a mile east by south (E. by S.) from this point of the island, so that deep laden vessels leaving the Oakland Pier should steer south until Alcatraz Island is well opened to the east of Yerba Buena Island, before hauling up to the usual anchorage off the city front.

LIGHT-HOUSE ON YERBA BUENA ISLAND.

For the benefit of the ferry traffic between San Francisco and Oakland, and for [illegible] vessels loading at the end of the railroad wharf stretching two and one-fifth miles from Oakland shore, a Light-house, fog-bell, and steam-whistle have been established on the [illegible] of the southeast point of the island. The low, hexagonal, wooden tower for the Light is [illegible] pitch of the rocky point about twenty yards from the shore-line. The keepers' dwelling [illegible] and a half stories, painted light buff, is built higher up the hillside in the rear of the tower. The tower is painted light buff and the lantern and dome red. The illuminating apparatus [illegible] fifth order of Fresnel and illuminates the horizon two hundred and forty degrees, from [illegible] by east half east (N. by E. ½ E.) round by east and south to west (W.); and to the westward [illegible] of visibility is on a line to Point Cavallo. It was first exhibited in 1875 and shows from [illegible] to

sunrise a *fixed white light.* The base of the tower is seventy-five feet above the level of the sea, and the focal plane is twenty-two feet above the base. In ordinary states of the atmosphere, the Light should be seen at a distance of between twelve and thirteen miles. It can be seen from Point Boneta open to the north of Fort Point, and from the middle of the Golden Gate.

The geographical position of the Light-house, as determined by the Coast and Geodetic Survey, is:

Latitude	37°	48′	21″	north.
Longitude	122	21′	45″	west.
Or, in time	8h	09m	27s.0	

The Magnetic Variation, January, 1885, was 16° 34′ east, increasing 0′.3 annually.

From Yerba Buena Light we have the following bearings and distances to prominent points:

Point Cavallo (passing ¼ point S. of Alcatraz)	S.	88	W.	5¼ miles.
Lime Point Fog-whistle	S.	86	W.	5¼ miles.
Point Boneta Light-house	S.	77	W.	8 miles.
Fort Point Light (passing just clear of Black Point)	S.	74	W.	5¼ miles.
Ferry slip, foot of Market street, San Francisco	S.	48	W.	1¼ miles.
Dry-dock at Hunter's Point	S.	20	E.	4¼ miles.
End of Railroad Pier, extending from Oakland	NE.	by	E.	¾ mile.

FOG-SIGNAL ON YERBA BUENA ISLAND.

Immediately on the shore-line, under the Light-house, are erected the small fog-signal structures painted light buff with roofs of dark red. The fog-signal is a ten-inch steam-whistle giving *blasts four seconds long* with *intervals* of *sixteen seconds.* During the beginning of a fog, until steam is raised, or if the whistle is disabled, a *bell is struck at intervals of ten seconds* until the whistle is ready for operation.

The shoal reaching northwestward from the north side of Yerba Buena Island is marked by a beacon, which is described under the head of Dangers in the Bay of San Francisco, page 1888.

In early times Yerba Buena Island was densely covered with wood and was known to navigators and whalers as Wood Island. On old Spanish charts it was called Isla del Carmen. Beechey, 1826, gave it the present name. It has become locally known as Goat Island; on a late map it is called Ghote Island.

DANGERS INSIDE THE BAR OF SAN FRANCISCO AND AIDS TO NAVIGATION.

No hidden dangers exist outside the "Heads" of San Francisco Bay except rocks immediately upon the shore-line, and the sunken rock described off the old light-house tower of Point Boneta.

Inside the Heads the known dangers, visible and hidden, are few in number.

The Mile Rocks inside Point Lobos have already been described, pages 175–176.

Fort Point Ledge.—Off Fort Point lie several sunken rocks forming a dangerous ledge on the southern edge of the fair-way channel of the Golden Gate, but close under the shore. The first rock lies one hundred and fifteen yards off shore northwest by north (NW. by N.) from Fort Point Light, and has nine and a half feet of water on it, with three fathoms close alongside; the water deepening to seven fathoms at a distance of one hundred and seventy yards outside. The second rock lies one hundred and twenty yards off shore northeast by north three-quarters north (NE. by N. ¾ N. from the Light, with eleven feet of water on it and four fathoms close outside, the depth increasing very rapidly towards the channel. A third sunken rock, with only seven feet of water on it, lies sixty yards south-southwest (SSW.) from the nine and a half foot rock, and one hundred and fifty-five yards north fifty-three degrees west (N. 53° W.) from the Light. A rock, bare at low water, lies half-way between the second sunken rock mentioned and the shore, and nearly in range with the eastern line of the Fort; whilst another, bare at low water, lies one hundred yards west half south (W. ½ S.) from the last one.

This ledge is now marked by a *mammoth nun-buoy painted red* and numbered 2, as described on page 177.

PRESIDIO SHOAL.

This shoal, having as little as three and a half fathoms upon it, is in fact the southwestern extremity of a long submarine ridge which stretches from the northwestern part of Alcatraz Island towards Fort Point. The five-fathom southwest tail of this shoal lies four-fifths of a mile

inside Fort Point Light, and bears north sixty degrees east (N. 60° E.), or half a point to eastward of the line between the Lights on Fort Point and Alcatraz Island. The passage between the tail of this shoal and the three-fathom line under the Fort Point shore is one-third of a mile in width with good water over brown mud and sand.

The general direction of the shoal towards Alcatraz Island is northeast three quarters east (NE. ¾ E.) for one and a half miles, then north (N.) half a mile, then northeast three-quarters east (NE. ¾ E.) to the west end of Alcatraz. It is a narrow ridge not over one eighth of a mile wide inside the six-fathom lines; the bottom is sand and fine gravel, doubtless formed by the meeting of the ebb-currents from the northern and southern parts of San Francisco Bay. The depths upon this shoal ranges from three and a half to seven fathoms. There are but two or three spots with four fathoms and less upon them, and the spots with five fathoms are limited to the tail of the shoal and to a small patch seven sixteenths of a mile south sixty-five degrees east (S. 65 E.) from Arch Rock.

The deepest water upon it is when the Flag-pole on Black Point bears south fifty-eight degrees east (S. 58 E.) and the Light-house on Alcatraz Island bears north forty-four degrees east (N. 44 E.), with Shag Rock just open to the east of Arch Rock; here not less than six and three quarters fathoms can be carried over it. The pilots use the range of the Old Boneta Light tower on the extremity of Point Diablo for crossing it. When the Light was located at the old Boneta tower it was also a favorable night range. But when the fog sets into the Golden Gate this back range is lost.

Presidio Shoal Buoy.—The three and a half fathom patch near the tail of the shoal is marked by a *second class can buoy painted red and black horizontal stripes.* It lies in twenty-one feet of water and vessels may pass in safety on either side by giving it a berth of fifty yards.

From this buoy we have the following bearings and distances to prominent objects:

Fort Point Light-house	S. 62 W.	1¼ miles
Anita Rock Spindle	S. 11 E.	⅝ mile
Alcatraz Island Light-house	N. 48 E.	1¾ miles.

Arch rock is on with the southeast point of Angel Island.

The shoal was named by the Coast and Geodetic Survey in 1857; it is locally known to the pilots and others as the "Middle Ground."

ANITA ROCK.

This rock shows above water at the lowest tides, and is less than three hundred yards off the low shore under the Presidio of San Francisco, and directly off the Presidio wharf. The extremity in three fathoms of water lies two hundred and fifty yards south of the spindle on the rock. It lies one and one eighth miles north eighty degrees east (N. 80° E.) from Fort Point Light. There is deep water all around it and a passage with seven fathoms of water between it and the shore. The shoal patch within the three-fathom curve extends forty yards south and sixty yards west of the rock. The currents set strongly across the rock and shoal, and vessels should not approach this rock to the northward within a cable's length.

Anita Rock Spindle.—The rock was formerly marked by a buoy but it is now marked by an iron spindle secured in the rock and projecting twenty four feet above high water. This spindle is crowned with an *iron cage* nine feet long and five feet in diameter, painted in *horizontal stripes black and red*; and above this cage is a glass globe twenty-two inches in diameter and about [illegible] feet above high water. This globe will show bright in ordinary weather.

The spindle is to be left on the starboard hand by vessels entering, but may be passed on either side by small vessels. To avoid it, keep Point Boneta Light open to northward of Fort Point.

From this beacon we have the following bearings and distances to prominent objects:

Fort Point Light-house	S. 80 W.	1¼ miles.
Alcatraz Island Light-house	N. 38 E.	1¾ miles
Black Point Flag-staff	N. 76 E.	1¼ miles
Presidio Shoal Buoy	N. 14 W.	⅝ mile.

Anita Rock was named after the United States quartermaster's bark *Anita*, which struck upon it many years since.

West-southwest (WSW.) one-quarter of a mile from Anita Rock, and immediately outside the three-fathom line, lies a *small gravel shoal* upon which a depth of five feet of water is found with

ten feet inside of it. Its extent inside the six-foot line is about one hundred and fifty yards parallel with the shore and sixty-five yards at right angles thereto. It is especially dangerous to vessels beating out under the south shore on the beginning of the ebb; but it can be avoided by keeping Point Boneta open to the northward of Fort Point.

ARCH OR BIRD ROCK.

This is a small pyramidal, dark rock about forty feet in diameter, thirty-five above water, and lying to the northward of the usual ship-channel into San Francisco Harbor. In the dry season it is covered with bird deposits and shows a dirty white color. When seen in the direction towards, or from, the tail of the Presidio Shoal it presents a perforation or arch-way at low tides. There is deep water, five to eight fathoms, on its eastern side, but the three-fathom line runs one hundred yards to the northwest from it, dropping off into ten fathoms; and one hundred yards south-southeast (S.SE) from it there is a depth of three and three-quarters fathoms with rocky bottom. The bottom to the eastward is rocky, and to southwestward coarse gray sand. Vessels should not approach the rock within two hundred yards, as the flood-current sets directly on it, and if the wind is light or dies out they may drift into danger. Numerous vessels have been injured by drifting on Arch Rock, especially in coming in on the flood-tide at night with little or no wind and the weather foggy.

From Arch Rock we have the following bearings and distances to prominent objects:

Alcatraz Island Light-house (Southeast end of Alcatraz, over north neck of Yerba Buena.)	N. 84° E.	¾ mile.
Fort Point Light-house	S. 41° W.	2 miles.
Lime Point Fog-whistle	S. 73 W.	1⅞ miles.
Eastern Four-fathom spot on Presidio Shoal	S. 60 E.	⅞ mile.
Shag Rock	N. 19 W.	½ mile.
Sancelito Steamboat Wharf	N. 63 W.	2¼ miles.

Point Boneta Light is just shut in by Point Diablo.

The rock is now known only as Arch Rock.

SHAG ROCK.

This is a low rock one-third of a mile north-northwest (NNW.) from Arch Rock. It shows about four feet above the highest tides, being then not more than eight or ten feet in extent. In the dry season it shows white-topped on account of the deposits of sea-fowl. The bottom about it is irregular, but the soundings indicate not less than four and a quarter fathoms fifty yards to the southeast, with deeper water close to it on the other sides. A three-fathom spot has been located nearly three hundred yards east of the rock on the line to north end of Yerba Buena Island. With this exception there is a depth of ten fathoms within one hundred and fifty yards in every direction.

From Shag Rock we have the following bearings and distances to prominent objects:

Alcatraz Island Light-house	S. 77° E.	1 mile.
Arch Rock	S. 19 E.	¼ mile.
Lime Point Fog-whistle	S. 57 W.	1⅞ miles.
Sancelito Steamboat Wharf	N. 69 W.	2¼ miles.
Southeast point of Angel Island	N. 29 E.	1¼ miles.

and on the line of north side of Alcatraz and south side of Yerba Buena Islands. (Wheeler's city map of 1855 calls this Seal Rock.)

BLOSSOM ROCK.

This rock formerly had only five feet of water upon it, but the Government had it removed to a depth of twenty-four feet at mean low water. There are five or six small points having only twenty-four feet upon them within an area of thirty-five yards. Within the five fathom line the extent of the ledge is eighty yards northeast and southwest (NE. and SW.) by forty yards across; outside of this the depth increases to ten fathoms in twenty to forty yards.

Strong currents sweep over the ledge, and vessels should give it a good berth on all sides. It is of course a danger to deeply laden vessels and especially to iron-clad men-of-war that enter the harbor.

Blossom Rock Buoy.—To mark this danger a *second-class can-buoy* with *red and black horizontal stripes*, has been placed upon the ledge, which will have only twenty-two and a half feet of

water upon it at the extreme low tides. Sometimes this buoy is swept by strong currents or shifted by passing vessels into deeper water, but it is replaced on the ledge as soon as this is seen.

Vessels should give it a good berth on either side because there are frequently heavy overfalls or rips around and over it.

From this buoy we have the following bearings and distances to prominent objects:

Southeast Point of Angel Island	N. 35° W.	2.2 miles.
Alcatraz Island Light-house	N. 70° W.	1 mile.
Black Point flag-staff	S. 45° W.	1¼ miles.
Telegraph Hill (at night, electric light, private)	S. 8° E.	1 mile.
Yerba Buena Island Light-house	S. 87° E.	2 miles.

Yerba Buena Island Light is open just off the south point of the ledge.

The rock was discovered and named by Beechey after his ship *Blossom*, in November, 1826.

YERBA BUENA ISLAND SHOAL.

From the extreme northwest and northeast points of Yerba Buena Island as a base, this triangular shaped shoal, averaging half a mile in width, stretches one and one-quarter miles to the northwest by north (NW. by N.). The outline of this shoal is very regular, and the approaches are steep, on its west side; but on the northeast side it deepens gradually towards the deep water on the northeast side of the island. The depth of water on it ranges from one to eighteen feet, the least water being near the northeast point of the island.

A comparison between recent and older surveys shows that this shoal has a tendency to grow in two.

Yerba Buena Shoal—Buoy.—To replace the beacon destroyed near the north end of Yerba Buena shoal, a *first-class can-buoy*, painted *red* and *black horizontal stripes*, has been moored to mark the north end of this shoal. The buoy lies in three and a half fathoms of water, on the following ranges: High Chimney on Potrero Point over middle of Mission Rock; and Mount Diablo in line with the north end of Alcatraz Island. It is one and nine-tenths miles south-east by east three-eighths east (SE. by E. ⅜ E.) from Alcatraz Island Light-house.

MISSION BAY ROCKS.

Mission Bay was formerly a deep indentation of the shore-line on the east front of San Francisco, forming at low water an extensive mud-flat; it is now straightened out by wharves. Off this bay or cove was a large, rocky islet called Mission Rock, upon and around which piers and warehouses have been constructed to four and a quarter and five and a half fathoms water for shipping. The extent of this islet is now eight hundred and thirty yards by four hundred and fifty yards.

Between this Mission Rock wharf and the wharves from the main shore is a passage seven hundred and twenty yards wide, which is a very busy thoroughfare for large and small vessels, but *two dangerous, sharp-pointed rocks* have been found in this passage, nearly on the line of the west face of Mission Rock wharf, and to the southward thereof in the middle of the five fathom channel.

The first of these dangers is named the *Mission Bay Rock*. It is double-headed, and about not more than three feet across and the heads ten feet apart. There is a depth of two and a half feet on them, with five fathoms over muddy bottom close around them. The rock is one three hundred yards south by west (S. by W.) from the southern point of Mission Rock wharf, and about one hundred and fifty yards from the end of the Central Pacific Railroad wharf. This rock was discovered in 1871, and is now marked by a buoy, as follows:

Mission Bay Rock Buoy.—This is a *third class nun buoy* with *black and red horizontal* stripes. It is placed in eighteen feet of water near the shoalest part of the rock. It may be passed on either hand by giving it a good berth, bearing in mind, however, the southern rock, two hundred and seventy yards to the southward, which is also marked by a buoy.

It is reported that a third head has been discovered to the Mission Bay Rock, as mentioned from the examination of 1871. This third head lies one hundred feet south by east half east from the double point marked by the buoy.

The *South* or *Sonoma Rock* lies two hundred and seventy yards to the southward of Mission Bay Rock, and has thirteen and a half feet of water upon it, with four and three-quarters fathoms over muddy bottom on the inside, and five fathoms outside. The top of the rock is about

twenty feet in extent, and at the examination in 1878 it was reported to have a sharper point of only one foot across. The coal-laden bark *Sonoma* ran upon this rock when under tow, and had to be partly discharged to get off. She was not injured. The rock was again examined in November, 1884, and the position may be closely located by the following bearings and ranges: The range northern extremity of the new whaling company's wharf at Point of Rocks on with the South Pap, bearing southwest by west (SW. by W.); and from the end of the railroad company's wharf it bears southeast by east one-third east (SE. by E. ⅓ E.), and nearly on the prolongation of the wharf. This rock is now marked by a buoy, as follows:

Sonoma Rock Buoy.—This is a *third-class nun-buoy* with *red and black horizontal stripes*, and is placed in fourteen feet of water near the top of the rock. It may be passed on either hand.

ALCATRAZ ROCK AND BUOY.

A sunken rock, bare at the lowest tides, lies on the north edge of the three-fathom ground on the west side of Alcatraz Island, one hundred and forty-five yards nearly west-southwest (WSW.) from the extreme western point.

The *Wreck Buoy* is a *third class spar-buoy, painted green* and marked "*wreck.*" It has been placed in twenty-four feet of water in the foul ground making southwest from the west end of Alcatraz Island. It is about two hundred yards southwest (SW.) from the western point of the island, and fifty yards south one-eighth east (S. ⅛ E.) from Alcatraz Rock. It marks the recent wreck of the bark *Oliver Cutts.* The *Autocrat* was sunk here long ago, but after the wreck had been destroyed the green buoy was removed until the last wreck caused it to be replaced. It retains the name of the "Autocrat."

SOUTHAMPTON SHOAL.

This extensive shoal lies nearly in the middle of San Francisco Bay to the northward of Angel Island, and is therefore a menace to the navigation of large vessels bound to Vallejo, Mare Island, Benicia, Port Costa, or Antioch. Within the three fathom line, it is two and a quarter miles long northwest and southeast nearly, with an extreme breadth of one third of a mile. It is very uniform in shape, with a five-fathom channel* on the east side, and six to seven fathom channel on the western side. The west side of the shoal is quite steep, falling sharply from two fathoms to six and seven fathoms. The least water on the shoal is four feet, and the bottom is fine sand, very soft or yielding. At one of the current-stations of the Coast and Geodetic Survey on the middle of the shoal, this sand was found to be underlaid by mud at the depth of seven feet. The shoal is evidently formed by the meeting of the sub-surface, young flood-current from the Raccoon Strait with the yet strong ebb-current from San Pablo Bay. At a current station half-way between the northeast entrance to the Strait and the Southampton Shoal the sub-surface flood-current was setting in at the rate of about one knot, and in a direction differing more than nine points with the direction of the surface ebb-current still running at the rate of one and a half knots.

It is reported that there is less water on the shoal and that it has been extended in length since the last survey. Ringgold gave the range Fort Point on the westernmost point of Angel Island (seen through Raccoon Strait) for clearing it outside of the three-fathom buoy which he placed on the north end. The same range will now pass over seventeen feet of water at the north end; but we do not know whether his range was an actually observed range or a range subsequently adopted from the chart; nor does his chart give his plane of reference.

The ends of the shoal are marked by buoys as follows:

The Buoy on the southern end of Southampton Shoal.—The can-buoy marked with *black and red horizontal bands* that marked the south end of Southampton Shoal has been moved one-quarter of a mile southeast half south; and it now lies three and a quarter miles north three-eighths east (N. ⅜ E.) from Alcatraz Island Light-house.

It is in four fathoms of water about two hundred and fifty yards off the southern tail of the Southampton Shoal.

From it the following bearings and distances are given:

Red Rock	N. 45 W.,	3½	miles.
Point Campbell (North Point of Angel Island)	S. 61 W.,	1¼	miles.
South point of Brooks Island	N. 50 E.,	2¼	miles.
Market Street Wharf, San Francisco	S. 20 E.,	4¾	miles.
Buoy on Blossom Rock	S. 12 E.,	3½	miles.

* Named the Riley Channel by Ringgold, in 1850.

The Buoy on the northern end of Southampton Shoal.—This is a *first-class nun-buoy with red and black horizontal stripes.* It is placed in three fathoms of water at the lowest tides, and should be given a good berth by vessels passing it on the eastern side. This buoy takes the place of the fixed beacon which marked the same spot 1884.

From this buoy we have the following bearings and distances to prominent objects:

Buoy on the south end of the shoal	S.	43	E.	2 miles.
Southeast point of Angel Island	S.	17	E.	3¼ miles.
Western Point of Angel Island, through Raccoon Strait	S.	3	E.	3¾ miles.
Bluff Point, northeast point of entrance to Raccoon Strait	S.	10	W.	2 miles.
Red Rock Islet, 169 feet high	N.	47	W.	11 miles.
Point Richmond, on the eastern main shore	N.	79	E.	12 miles.

Fort Point Light-house is open nearly in mid-channel of Raccoon Strait.

Owing to the strong currents and contacts with small passing vessels, these buoys are sometimes moved out of position, but are replaced as soon as practicable. A good range by which to pass Southampton Shoal is to keep Red Rock Islet on the eastern extremity of Point San Pedro (on the northwest side of the entrance to San Pablo Bay.) This range can be taken from the city front of San Francisco, and passes close to the eastward of Blossom Rock.

The wreck of the Flying Dragon.—The wreck of this vessel, sunk early in 1862 inside the Golden Gate, and found between Arch Rock and Shag Rock, was marked as a danger to navigation; but now nothing whatever remains of her masts, which constituted the obstruction to navigation, and if any part of the hull still exists it lies in twenty fathoms of water.

Rincon Rock and Buoy.—The Rincon Rock of former charts was in part removed by the United States Engineers, and then the State Harbor Commissioners projected a wharf over it.

The dangers, etc., north of Southampton Shoal have not been described, as overloading this part of the work too much at present.

THE COAST OF THE GULF OF THE FARALLONES NORTHWESTWARD OF POINT BONETA

From Point Boneta to Duxbury Point, forming the west side of Ballenas Bay, the course is west by north one-quarter north (W. by N. ¼ N.) and the distance nine and a quarter miles. Thence the coast sweeps in the same general direction to the eastern part of Drake's Bay, to the west of which lies Point Reyes Head, twenty-five and two thirds miles north eighty two degrees west (N. 82° W.) from Point Boneta.

The coast-line northwestward of Point Boneta is very bold, broken, and elevated; it rises in places to as much as five hundred and twenty feet within two hundred yards of the shore, and to a thousand feet within a mile. It is transversely cut by the deep, narrow openings of small valleys stretching inland, such as Rodeo Valley seven-eighths of a mile from Point Boneta, Pinole Valley two miles, and Frank's Valley three and a half miles. These valleys give the coast-line its characteristic undulating surface very well delineated in the Coast Survey chart of the Golden Gate and approaches. The only beaches bare at high water are at the mouths of these valleys.

Rising above these transverse ridges is the prominent ridge of Mount Tamalpais or Table Mountain, reaching twenty-six hundred and four feet above the sea, with its eastern slope reaching only four miles from the coast. This ridge lies northeast and southwest for about two miles and forms a notable landmark which appears flat topped only in two directions. It is heavily wooded with trees and chaparral, whilst the lower ridges are generally grass-covered. It is of good use among the landfalls, and the views of the approaches to the Golden Gate exhibit its characteristic features.

In making the coast abreast of this mountain from the west southwest, with the thick haze (which sometimes prevails in summer before a prolonged fog) hiding the lower parts as well as the shore, the ridge is seen endways, and the peaks show as one and not as a table. A lower and smooth-topped hill, seventeen hundred and sixty feet in elevation, is seen two miles to the southeastward of the peak. Approached from the southwest, Mount Tamalpais shows two principal peaks: the eastern sharp peak, and a middle and lower peak just on the eastern edge of the western and highest peak. From the western slope of the mountain the lower and long ridge to the northwest is partially wooded.

From the Southeast Farallon Light-house the mountain bears northeast half north (N. N. E.) distant twenty-four miles, and it is visible sixty-two miles seaward.

This mountain is the "Table Hill" of Beechey (1826). It was subsequently called Mount Palermo by the United States Exploring Expedition (1841), but is never known by this name.

Ringgold called it Table Hill in 1850. It was named Table Mountain by the U. S. Coast Survey in 1850, and is known by that name among navigators. But the Coast and Geodetic Survey has (1884) adopted the name Mount Tamalpais. By the native Californians it is called Tamal Pais, because this part of the country hence to Tomales Bay was inhabited by the Tamal Indians, who in 1816 were within the jurisdiction of the Mission of San Francisco. The Tamal, Sumpal, and Suysum tribes tatooed themselves and spoke the same language. The last two tribes lived to the northward.

Rocky Point.—Along the shore to Rocky Point, which is six miles north sixty-six degrees west (N. 66° W.) from Point Boneta, there is but one rock above water outside the three-fathom curve, and so far as known only one sunken rock already mentioned as lying off the Old Light-house Tower.

Rocky Point is a shelving point of small extent, one hundred feet above the sea, with a deep wooded gulch just northwest of it. Behind it the land rises rapidly along a bold, rounding ridge to sixteen hundred feet in a mile and a half. A great many rocks lie off the cliffs out to the four-fathom line, which, however, is not more than two hundred yards from shore. This shelving point is one of the back ranges for entering or leaving San Francisco by the Boneta channel. Just under its south side, within one-third of a mile of the extremity of the point, the cliffs are very high and precipitous, rising to five hundred and forty feet within three hundred yards and then merging in the same transverse ridge as Rocky Point, of which it might be considered a part.

From Rocky Point we have the following bearings and distances to prominent points:

Point Boneta Light-house	S. 66°	E.	6 miles.
Buoy (in twelve fathoms) off Duxbury Reef	S. 47°	W.	3½ miles.
Tail of Duxbury Reef	S. 66°	W.	3 miles.
Duxbury Point	S. 85°	W.	3½ miles.

*Ballenas Bay**.—At seven miles from Point Boneta the rocky shores retreat, and a long, narrow sand spit stretches for two and one-quarter miles to the westward and forms part of the southern shore of Ballenas Bay, and the south shore of the large lagoon inside.

Ballenas Bay lies between Rocky Point and Duxbury Point, the latter bearing south eighty-five degrees west (S. 85° W.), distant three and a half miles from the former, whilst the north shore retreats a little more than a mile to the northward of this line. The bay is a small summer anchorage with three to nine fathoms of water over hard sand and mud bottom. The northwest shore of the bay is the face of Ballenas Bluff, one hundred and ten feet above the sea and stretching one and one-quarter miles north thirty-three degrees east (N. 33° E.) to meet the west end of Ballenas sand spit. The entrance to the *Ballenas Lagoon* is a narrow opening of but one hundred yards in width between the end of the sand spit and the bluff, with a very contracted channel having only one foot upon its bar at low water, so that the small produce schooners running between Ballenas and San Francisco must enter and leave at high water as they load on the west side just inside the entrance. The lagoon lies between the mountains and, except in small crooked channels, is bare at low water and partially filled with marshy islets. Ten feet of water is found at the narrowest part of the entrance.

The west side of Ballenas Bay has no more than three fathoms within three-quarters of a mile of Duxbury Point, but as only small vessels trade here they keep as close under Duxbury Reef and Point as possible in order to carry the summer wind into the lagoon.

There is one rocky spot in Ballenas Bay inside the breakers of Duxbury Reef. It lies one mile south sixty-seven degrees east (S. 67° E.) from the easternmost extremity of Ballenas bluff, and has thirteen feet upon it with five and three-quarters fathoms around it; the three-fathom curve and breakers of the reef are nearly one third of a mile to the southwest and northwest from it.

Just inside the entrance to Ballenas Lagoon, on the west side, was the United States Life Saving Station Ballenas. The building was burned in April, 1885.

The buoy off Ballenas Bay is named the Duxbury Reef Buoy, and is described under that head, and also under the Approaches to San Francisco.

* The name "Ballenas" is a compromise of several spellings. It was named after Francisco Volanos or Bolanos, pilot of Viscaino's expedition in 1602-3, and one of the pilots of the *San Augustine*, lost in this vicinity in 1595. On the first Coast Survey chart the name is spelled Banlenas. Ringgold called it Rialto Cove in 1850.

DUXBURY POINT AND REEF.

From Point Boneta to Duxbury Point, forming the west side of Ballenas Bay, the course is west by north one-quarter north (W. by N. ¼ N.) and the distance nine and one-third miles.

The point is sometimes known as Ballenas Point; it is the southeastern extremity of a table-land of one hundred and ten feet elevation, of which the eastern face stretches north thirty three degrees east (N. 33° E.) for one and a quarter miles, and the southwestern face north eighty degrees west (N. 80° W.) for one and a half miles to Ballenas Point proper. In a little over a mile this mesa gradually rises to a narrow, treeless ridge, thirteen hundred and eighty-nine feet at its greatest elevation thirteen miles from the point, and runs in a straight line northwest one-quarter west (NW. ¼ W.) for twenty-five and a quarter miles to Tomales Point at Bodega Bay. The native Californians very expressively named it the Cuchilla Grande. Parallel with and eastward of this ridge, and starting from the west end of the great cross ridge of Mount Tamalpais, runs another but partially timbered ridge to the northwestward; the depression between them, abreast of Duxbury Point, forms the Ballenas Bay and Lagoon as it does the Tomales Bay farther up the coast. This depression forms a long, narrow valley, well watered and timbered, and now mostly cultivated. From this valley a stream runs into each bay, but the head of each stream is nearer the opposite bay.

This point was named Banienas Point on the earliest surveys; and Ballenas Point up to the publication of the new chart of San Francisco Entrance and Approaches, on which it is called Duxbury Point.

Duxbury Reef makes out one and a quarter miles southeast one-quarter south (SE. ¼ S.) from the extremity of the bluff point; for nearly half a mile of that distance the rocky reef, one tenth of a mile wide, is above water, and thence breakers indicate its location and extent. This reef adds to the safety of Ballenas Bay as an anchorage in northwesterly weather. Close under the tail of the reef the depth of water is six fathoms; but there is a thirteen-foot spot one mile south sixty-seven degrees east (S. 67° E.) from Duxbury Point having three and three quarters to five fathoms around it. (See description of Ballenas Bay, page 191.)

From the tail of the reef to Rocky Point, the eastern limit of Ballenas Bay, the distance is three miles, and from this line to the greatest bend of the bay northward the distance is one and three-quarters miles with a depth of water gradually decreasing from nine fathoms.

Buoy off Duxbury Reef.—This is a dangerous reef to the approaches to San Francisco Bay, especially to vessels coming around Point Reyes from the northwestward; and to mark it a *first-class can-buoy*, painted with *black and red horizontal stripes*, has been placed in twelve fathoms over bottom of sand, mud, and pebbles. The buoy lies just one mile south-southeast (SSE.) from the tail of the drift. It is fully described hereafter under the head of Dangers in the Approaches to San Francisco Bar.

Making the reef from the southwest, the soundings drop from ten fathoms to four fathoms within a mile, and in thick, foggy weather a vessel must keep the lead going.

In June, 1860, the British bark *Camilla*, from San Francisco to Melbourne, drifted on a dead calm near Duxbury Reef and let go her anchors in six fathoms. When she swung to the swell and current her stern struck and she thumped for four hours.

Quite close to Duxbury Point the steamship *S. S. Lewis* went ashore, April 9, 1853, in a thick fog and calm, while running at her ordinary speed. She was backed off; ran ashore again within a few hundred yards to the northwestward and was totally lost in the breakers.

In 1867 the steamer *Montana* got on the rocks in a thick fog, but the rising tide relieved her.

Other casualties had occurred on this reef before the placing of the buoy.

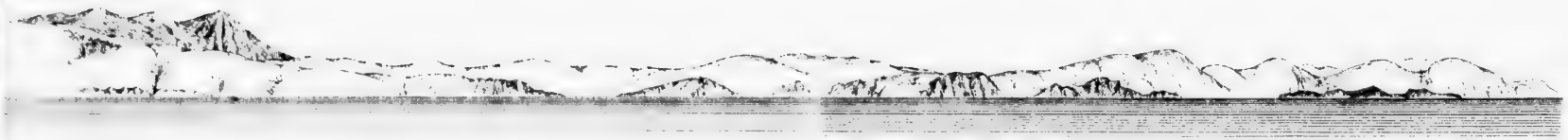
Ballenas Point.—This is the western extremity of the mesa land two miles wide westward of Ballenas Lagoon. It is one and a half miles west by north from Duxbury Point, and the shore-line between consists of steep cliffs, broken through in places, and bordered at the base by slightly projecting rocky ledges. To the northwestward this coast-line recedes nearly a mile before reaching the bold projection of Double Point. The cliff at the point is one hundred feet high, and about a quarter of a mile to the eastward it reaches one hundred and eighty feet. The land rises gradually for a mile to the northward to the southern limit of the Cuchilla Grande. All the adjacent cliffs are steep, rocky, and bordered by rocky reefs. There are some white houses on the mesa near the point, giving it quite a noticeable distinction from the southeastward and the northwestward.

Double Point, 500 feet.

Duxbury Point and Reef, NW. by N. ¼ N., 8 miles.

Approaches to the Entrance of San Francisco Bay (from the Buoy off the Bar).

Ballenas Bay.



Rocky Point.

Mount Tamalpais, 2,604 feet, N. ¼ E., 10¼ miles.

Point Boneta. NE., 7 miles.

Lime Point.

Point Diablo.

Point Boneta Light-house. NE., 7 miles.

Lime Point.

Point Diablo.

Golden Gate.

Alcatraz Island.

Fort Point NE. by E., 9 miles.

Mount Diablo, 36 miles, 3,848 feet.

Point Lobos, NE. by E. ¼ E., 7 miles.

Round Top.

Blue Mountain.

Ocean Side House.

From this point we have the following bearings and distances to important objects:

Point Reyes Light-house	S. 86° W.	15	miles.
Southeast Farallon Light-house	S. 29° W.	18	miles.
Duxbury Reef Buoy, in 12 fathoms	S. 50° E.	3¾	miles.
Point Boneta Light-house	S. 78° E.	11	miles.
West end Four-fathom Bank, Black Buoy in 6½ fathoms	S. 56° E.	7¾	miles.
Whistling Buoy off the Bar in 15½ fathoms	S. 34° E.	9¾	miles.

Double Point.—For ten miles northward of Duxbury Reef the hard, rocky shore continues bold, high, and precipitous, but gradually merges into cliffs, consisting chiefly of yellowish clay and sand resting upon granite; and as the surface is regularly undulating, with the direction of alternate ridges and valleys at right angles to the shore, the wearing action of the surf forms a continuous series of round-topped, bright, vertical bluffs, averaging nearly one hundred feet high, and presenting a very noticeable feature from the sea.*

Three and one-third, and three and three-quarters miles north fifty-nine degrees west (N. 59° W.) from Ballenas Point are two well-marked, high, precipitous, rocky cliffs coming boldly upon the water, and having slightly lower ground behind them. The southern one has a small rock close under its extremity and almost connected with it at low water. The highest point of this cliff is four hundred and sixty feet above the sea. The northern cliff has two rocks off it; one directly in front two hundred and fifty yards from the base of the bluff and extending from the three fathom line out to eight fathoms; it is one hundred and twenty-five yards long, and low. The second rock is less than one-quarter the size of the former and lies two hundred yards northwest by west (NW. by W.) from it in five or six fathoms. The height of this northern cliff is about the same as the southern one. These points are frequently referred to in placing the Duxbury Reef and other buoys, etc., and are exhibited in some of the views of this vicinity. They were named Double Point by the U. S. Coast and Geodetic Survey in 1883.

From Duxbury Reef northward the soundings are deeper close inshore, so that the ten-fathom line is very close upon the rock lying under Double Point, and thence continues only half a mile off shore into Drake's Bay.

The rock under the cliffs of Double Point looks like a whitish house with two dark windows when it bears about northeast.

DRAKE'S BAY.

From the tail of Duxbury Reef to the western head of Point Reyes the course is west three-quarters north (W. ¾ N.), and the distance seventeen and one-third miles. To the eastern head of Point Reyes the course is west by north (W. by N.), distance fourteen and one-third miles. From Duxbury Point the shore is bold and compact, as already described, running nearly northwest by west (NW. by W.) for about ten miles, then curving gradually to the westward, changing to a low shore, until it reaches its greatest latitude at the entrance to the Estero de Limantour, which bears north by east half east (N. by E. ½ E.), distant three miles, from the eastern head of Point Reyes. From the mouth of this estero the line curves to the southwestward and southward to within one mile west of the eastern end of Point Reyes, leaving a long, moderately high, narrow point stretching to the east, on the prolongation of which the breakers extend half a mile.

The white cliffs commence at the southwestern angle of the bay and continue round to eastward for nearly six miles, ending at high white sand dunes.

This curving shore-line forms Drake's Bay, which affords a large and admirable anchorage in heavy northwest weather; and, by anchoring close in under the north side of the eastern end of Point Reyes in four or five fathoms, hard bottom, good but contracted anchorage is obtained in southeast gales, as the swell rolling in from the southwest is broken by the reef.

In the spring of 1872 no less than sixteen vessels were anchored here at one time. In April, 1873, the revenue steamer *Wyanda* ran behind the reef in heavy southeast weather, and finding other vessels there, anchored with the extremity of the reef bearing east-southeast (ESE.), the cross on the eastern head bearing southeast half east (SE. ½ E.), and a high knob on the ridge bearing southwest half south (SW. ½ S.). In this position, which is one-quarter of a mile off the south side of the eastern point, the vessel got four fathoms over sticky bottom. When rounding the reef the swell was very heavy for a short time, but when the reef was passed the water was smooth.

* Its resemblance to parts of the coast of England was one of the reasons which induced Sir Francis Drake to apply the name New Albion to the country in June, 1579.

In approaching Drake's Bay from the southeastward, a vessel crossing the San Francisco Bar over the western end of the Four-fathom Bank near, but outside of, the western buoy, would steer a course west by north half north (W. by N. ½ N.), and, at four and a half miles, pass Duxbury Reef Buoy three-quarters of a mile on the starboard hand in twelve fathoms. Northward of that she can approach the shore-line if necessary, because the ten-fathom curve extends only about half a mile off-shore, and the fifteen-fathom curve about one mile. As Drake's Bay is approached the bottom becomes soft and sticky mud. Towards the east head of Point Reyes the soundings decrease very quickly, and in a distance of six hundred yards they range from twenty fathoms over hard bottom to breakers.

Approaching the bay from the westward, there is bold water close under the south face of Point Reyes, and the east point can be rounded just outside the breakers, which mark the reef. If it should be so exceptionally smooth that it does not break nearly one-half mile east from the point, round it at a little more than that distance on a north course; continue one-third of a mile and then haul in under the north side of the point.

Several esteros or lagoons open into the north side of the bay, but their entrances are very narrow and shoal. The largest is *Drake's Estero**, which stretches to the northward over three miles, and one of its numerous arms approaches within a mile of the ocean beach five miles north of Point Reyes Head. The entrance to this lagoon has eight feet of water, and is generally marked by breakers on either hand. Small coasters can enter with the prevailing northwest wind. We have watched them laying a course in close hauled, take one or two breakers, and run into smooth water.

The Tide at Drake's Bay.—The Corrected Establishment or mean interval between the time of the Moon's transit over the meridian and the time of High Water is XI^h 41^m. The mean rise and fall of the tides is three and six-tenths feet, spring tides four and a half feet, and neap tides two and seven tenths feet. The mean duration of the rise is 6^h 29^m; the mean duration of the fall is 5^h 53^m. The average difference between the Corrected Establishment of the a. m. and p. m. tides of the same day is 1^h 36^m for high water, and 0^h 40^m for low water. These differences, when the moon's declination is greatest, are 2^h 36^m and 0^h 48^m respectively. The average difference in height of the a. m. and p. m. tides of the same day is one and one-tenth feet for the high waters, and two and a half feet for the low waters. When the moon's declination is greatest, these differences are one and one half feet and three and nine-tenths feet, respectively. The average difference of the higher high and the lower low waters of the same day is five and four-tenths feet, and when the moon's declination is greatest, six and three-tenths feet. The higher high tide in the twenty-four hours occurs about 10^h 53^m after the moon's upper transit, when the moon's declination is south. The lower of the low waters occurs about seven hours after the higher high water.

The Coast and Geodetic Survey Tide Tables for the Pacific Coast show the relation of the tides of Drake's Bay to those of San Francisco under the head of Tidal Constants.

At Point Reyes the high waters are twenty-five minutes earlier and two-tenths of a foot higher than at San Francisco.

The secondary astronomical station of the Coast Survey was on the north side of a small gully, five-eighths of a mile from the eastern end of Point Reyes, and about eighty feet above the water. Its geographical position is:

Latitude	37	59	35.0	North
Longitude	122	58	35.0	west
Or, in time	8^h	11^m	54^s.	

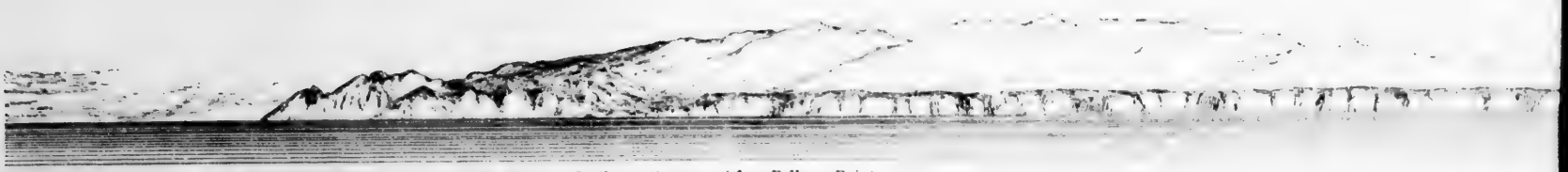
The magnetic variation for January 1, 1885, is 16° 45′ east, with a yearly increase of 7′.

The bay was formerly known as Sir Francis Drake's Bay. This is the Puerto de San Francisco of the Spaniards as far back as 1595. It was certainly known before the time of Vizcaino, who, having separated from his tender, sought her in Port Francisco, according to Venegas' account.

"To see if anything was to be found of the *San Augustine*, which, in the year 1695, had, by order of the viceroy, been sent from the Philippines by the governor to survey the coast of California, under the command of Sebastian Rodriguez Cermeñon, a pilot of known abilities, but was driven ashore in this harbor by stress of the wind; and among others on board the *San Augustine* was the pilot Francisco Volanos, who was also pilot of the squadron."

This pilot recognized the bay as being that where he was wrecked.

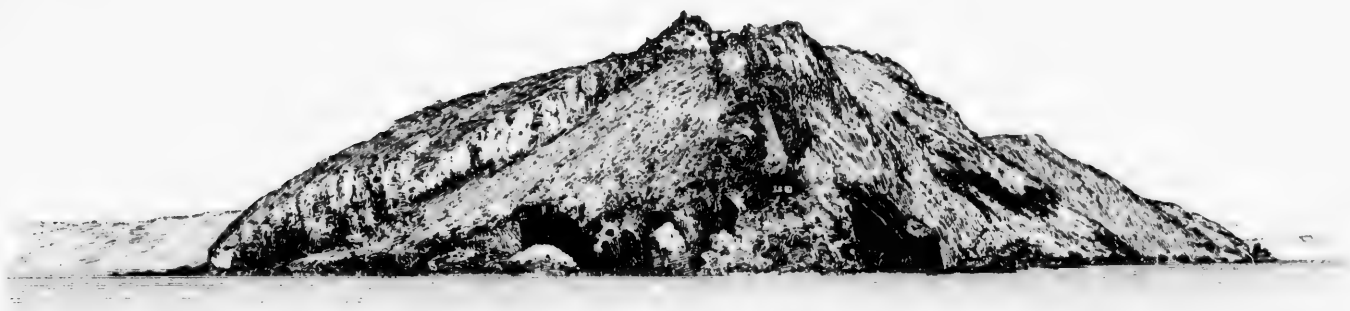
* Formerly called the Estero de Limantour, after Limantour who lost the Mexican vessel *Ayacucho* near the entrance to this lagoon about 1841. It received its present name from the U. S. Coast Survey in 1860.



Double Point, NW. ¾ W., 7 miles, 500 feet; it is 5 miles northwestward from Ballenas Point.

Breakers. 200 feet. Breakers. Chimney Rock, N.NW., 2 miles.

Eastern extremity of Point Reyes Head.



Fog-siren.

Water-tank. Light-house. Chimney Rock, Eastern Point, 4 miles.

Point Reyes Light-house and Fog-siren, E. ¾ N., 1 mile.

On the 14th September, 1779, the *Favorita* under Bodega y Quadra anchored in San Francisco abreast the Presidio, and he reports having recognized to his satisfaction the Puerto de San Francisco in which was lost the *San Augustine* from the Phillipine Islands, and which port is two miles to the east of Point Reyes.

It has been a question whether Sir Francis Drake anchored and "trimmed" his ships in this bay or in San Francisco Bay; a careful weighing of the evidence is clearly adverse to its being in the latter. (See remarks on San Francisco and also see "Early voyages of discovery and exploration on the northwest coast of America from 1539 to 1603;" Superintendent's annual report, Appendix No. 7, 1886.) The Nicasio Indians are said to have a tradition that Drake landed at Drake's Bay. He left a dog, some pigs, seeds of several kinds of grain; and some biscuits, which the natives planted! Some of his men deserted, and mixed with the tribes adjacent.

On an old Spanish chart there is a little indentation of the coast-line about the latitude of Point Reyes which is designated "Bahia de S. Francisco Drak."

Drake's Bay is very minutely and accurately described in the Treatise on Navigation published by the Spanish admiral, José Cabrera Bueno Gonzales,* at Manila in 1734. He directs that during south or southeast winds vessels anchor in the southwest angle of Drake's Bay, abreast the termination of the beach, and they may also enter the estero, on the banks of which were living large numbers of Indians. This estero he places "abreast the three white cliffs to the southeastward, where there is an estuary of the sea which has a good entrance without obstruction" (the Estero Limantour or Drake's Estero). It would appear from his description that Gonzales himself drew his information from other parties, notwithstanding the details which he furnishes us. He placed it in latitude 38½°, but his latitudes of Points Arena, Reyes, and Año Nuevo average half a degree too high.

Gemelli† says (1697) that the "Port de Los Reyes" is a good one, and also that of Don Gaspar in latitude 38°; but he was only a passenger in one of the Phillipine ships and did not sight the coast until the vessel reached the Santa Barbara Islands. He doubtless was repeating the opinion of the navigators.

POINT REYES.

In some respects this is the most prominent and remarkable headland north of Point Conception. It is the northwestern point of the Gulf of the Farallones, and is distinctly visible from the entrance to San Francisco Bay. The crest line of the ridge presents an irregular, jagged outline, with the highest part about one-fourth of its length from the western extremity. Its southern face is a precipitous wall of hard sienitic granite, rising boldly from the ocean, attaining an elevation of five hundred and ninety-seven feet in three hundred yards, and stretching in a nearly straight line east by north and west by south (E. by N. and W. by S.) for three miles. This direction is peculiar on the coast, and would not be expected from a consideration of the trend of the coast mountains and of the Farallones, which are in line northwest and southeast. On the north side the cape is covered with grass and falls away regularly to a low, undulating neck of land, one mile wide, cut up in places by esteros making in from Drake's Bay. When made from the southward, Point Reyes is raised as a long, moderately high island; but on approaching it from the westward, it is projected upon the mountains running north from Mount Tamalpais, and its characteristics are not so readily recognized unless the haze is lying pretty dense over the lower rolling land behind it. In coming from the northwest the head first shows as a long, blue island standing well out from the higher Point Reyes Ridge,‡ which lies eight miles to the northeastward. This was one of the features noticed in the landfall by the old Spanish navigators.

The western head projects over half a mile seaward (west southwest) as a high, narrow ridge with broken extremity and sides. Northward of the western head, the shore-line is low, straight, bordered by a sand beach, and has no rocks or hidden dangers. The eastern head stretches eastward one mile as a narrow, moderately high ridge, and protects the southeast anchorage of Drake's

* [illegible] published a work on navigation entitled "Navegacion especulativa y practica, con la explicacion de algunos instrumentos que estan mas en uso entre los Navegantes, con las reglas necesarias para su verdadero uso: Tabla de las declinaciones del Sol, computadas el meridiano de San Bernardino: y modo de navegar por la geometria, el quadranto de reduccion, los seños logaritmicos; * * * con estampas y figuras, Manilla, 1734."

† [illegible]anni Francesco Gemelli Carreri made his tour round the world from Naples eastward in 1693-99, and his book, Giro del Mondo, was published at Naples in 1699.

‡ [illegible] the mountain ridge stretching from Point Ballenas to Point Tomales and known as the Cuchilla Grande by [illegible] y Californians.

Bay. The base of this headland is very broken and rocky, and bordered by crags and hu[illegible] of rocks, but may be boldly approached, and eight fathoms, hard bottom, obtained with[illegible] than a quarter of a mile from the shore. Off the eastern extremity a reef makes out half [illegible] on the prolongation of the point. Upon this reef the sea breaks heavily in bad southerly w[illegible] but a depth of nine fathoms can be carried close to the breakers. Inside the reef and poin[illegible] is good anchorage in southeasters and capital protection in heavy northwesters. (See descr[illegible] of Drake's Bay, page 193.)

The *Chimney Rock Islet* lies off the eastern face of the point forming Drake's Bay, and a[illegible] separated therefrom when bearing north-northwest. It is estimated to be sixty feet high.

Off the western extremity of this headland a depth of twelve fathoms is found close[illegible] rocks, and twenty fathoms within a mile. Around the southern face the depth is eight to[illegible] close to the rocks, and twenty fathoms one mile off shore. In one and a half miles the [illegible] fathom plateau is reached, and, with gradual increase to the southward, it forms part [illegible] great plateau of the Gulf of the Farallones.

Nineteen miles west by south half south (W. by S. ½ S.) from the western head of Point [illegible] lies the Cordell Bank with soundings of twenty-five fathoms upon it; but between the h[illegible] the bank the water deepens gradually to about sixty-five fathoms at thirteen miles over a bot[illegible] soft, green mud; and then the depth decreases over a bottom of coarse sand and broken sh[illegible]

This soft green mud is a distinctive feature of the soundings hence to the northward. T[illegible] peculiarity extends southward of the head only to a line five miles long on a southwest [illegible] and south of that the bottom is generally hard or soft gray sand.

Vessels from the northward, bound to San Francisco, always endeavor to make Point Reyes and if the weather be clear, they sight, between the high ridge of Mount Tamalpais or Tabl[illegible] Mountain to the east and Montara Mountain to the southeastward, two mountains on the so[illegible] peninsula of San Francisco that show as islands. One of these is Blue Mountain, the h[illegible] part of the mass known as the Mission Hills, nine hundred and twenty feet above the s[illegible] the other is Abbey Hill, the highest part of the San Bruno Mountain, thirteen hundred a[illegible] twenty-five feet high.

POINT REYES LIGHT-HOUSE.

The tower for this light stands on the westernmost pitch of Point Reyes, and as low [illegible] as practicable in order to be under some of the fogs and also that it may be visible from th[illegible] eastward and the northward. It is an iron tower, the frustum of a sixteen-sided pyra[illegible] twenty-three feet in height, and painted white. The top of the lantern is painted red, a[illegible] is an open iron balustrade around the lower part painted black; also an open balustrad[illegible] the upper part of the tower painted black. The illuminating apparatus is of the first ord[illegible] system of Fresnel; it was first exhibited December 1, 1870, and shows from sunset to s[illegible] short *white flash every five seconds*. The focal plane is two hundred and ninety-six feet above [illegible] level of the sea, and the light should be visible in a favorable state of the atmosphere [illegible] height of—

10 feet at a distance of 23.4 miles.
20 feet at a distance of 24.9 miles.
30 feet at a distance of 26.0 miles.
60 feet at a distance of 28.6 miles.

From a ship's deck it is visible from the Whistling Buoy off San Francisco Bar.

The compass range of visibility is from north by east (N. by E.) through the west to east half north (E. ½ N.), so that a vessel sees it along the south face of the headland and [illegible] extreme point; and also sees it from the beach immediately to the northward.

The arc of visibility of the light is limited by the near rocky parts of the head. [illegible] from N. 15° E. on the north beach, distant two and a third miles, around by the north, w[illegible] and east to N. 81½° E. along the south face of the head.

The keeper's dwelling is a white structure, two hundred and fifteen feet higher tha[illegible] of the light-tower, and on the north face of the point.

The geographical position of the Light-house, as determined by the Coast and Geo[illegible] vey, is:

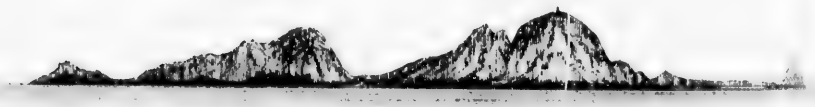
Latitude	37°	59′	36″	north
Longitude	123	01	21	west
Or, in time	8h	12m	05s.4	

The magnetic variation for January, 1885, was 16° 45′ east and the yearly increase [illegible]

Southeast Farallon Light-house, NW. by W. ¼ W., 6 or 7 miles.

Southeast Farallon Light-house, SE. ¾ S., 2¾ miles.

Middle Farallon, N. by E. ½ E., 6½ miles.



Outlying Seal Rock.

Southeast Farallon Light-house, NE., 6½ miles

From the Light house we have the following bearings and distances to prominent objects:

Duxbury Reef Buoy, in 12 fathoms	S.	79½°	E.	18 miles.
Point Bonita Light house	S.	82°	E.	26 miles.
Whistling Buoy, in 15 fathoms outside San Francisco Bar	S.	67½°	E.	22⅝ miles.
Southeast Farallon Light-house	S.	20°	E.	17¼ miles.
Northwesternmost of the North Farallones	South			14 miles.
Noonday Rock, Mammoth Buoy	S.	12⅝°	W.	14 miles.
Bodega Head	N.	22°	W.	18¼ miles.
Point Arena Light-house	NW.	¼	W.	67 miles.

White Rock off Tomales.—From Point Reyes Light the White Rock off Tomales Point bears N. 7° E., distant fourteen miles.

POINT REYES FOG-SIGNAL.

The fog-signal building and out-buildings are painted white, and are situated on a small space on the western pitch of Point Reyes one hundred and sixty-five feet above the sea, and about one hundred feet below the Light-house.

During foggy weather a steam fog-siren is sounded by *blasts of five seconds' duration with intervals of seventy seconds.*

Vessels report that they lose the sound of the siren when close under the shore northward of Point Reyes.

The British Admiralty chart of the Pacific Coast, No. 2461, with corrections to March, 1865, had a light on Point Reyes marked Lt. Fl. (flashing light) before one was established there. The Russian corvette *Norick* was wrecked two miles north of Point Reyes in having been misled by an English chart which had a light marked on this head.

This headland was seen by Cabrillo in November, 1542, but not named; he beat about one whole day in the great gulf under its lee. (See note on the name Gulf of the Farallones.)

It was next seen by Sir Francis Drake in June, 1579, when he anchored in the bay under the eastern point for seven weeks.

The name Punta de los Reyes was given to the headland by Vizcaino, who anchored in Drake's Bay, or the Estero de Limantour, in January, 1603, whilst searching for the wreck of the *San Augustine*, which was wrecked in this vicinity in 1595. It was more particularly described by Admiral José Cabrera Bueno Gonzales in 1734, who placed it in latitude 38½°. His description can not be mistaken, and as he gives the latitudes of other headlands on the coast only to degrees and half degrees, and as the average error is forty minutes too great, we are able to apply this correction to Point Reyes. (See notes to Drake's Bay and The Farallones.) Miguel Constanzó erroneously estimated its distance from Montara Point and placed it in 37°44′. The name has been shortened by navigators to its present form, Point Reyes.

Imray's chart, in 1849, calls Point Reyes Point *Reeves.*

Current off Point Reyes.—In June, 1859, while we were occupying the station on Point Reyes Hill (thirteen hundred and eighty-nine feet high, and eight and three fifths miles northeast half north (NE. ½ N.) from Point Reyes Head, we observed during a long, perfect calm, a bark, having a leeway way and turning round several times, drift to the northward past Point Reyes at the rate of one mile per hour. She was two miles to the westward of the head. On this and subsequent occasions we noticed the discolored water of the Sacramento from San Francisco Bay close inshore and extending to the northward of the head several miles. Different degrees of discoloration, as of successive ebb tides, were plainly marked.

THE SOUTHEAST FARALLON.

The southeastern and principal one of the six rocky islets, known as the *Farallones de los Frayles*, lies off the Golden Gate at a distance of twenty-three miles. It is the largest and highest of the group which is disposed in a general west-northwest and east-southeast direction (N. 65° W.) for seven miles; and if we include the Noonday Rock the distance is nine and a half miles. This southernmost islet is three-quarters of a mile long in its longest direction, and three-fifths of a mile wide at its greatest breadth. This does not include half a dozen high rocky islets close under its shores. Its general direction is west by south (W. by S.), and it is marked by several jagged peaks, although three principal ones command the rest. The principal peak, upon which the Light-house is situated, attains an elevation of three hundred and forty feet; whilst under it

on the southern shore the island is only elevated thirty feet above the sea. The whole island is singularly wild, barren, and desolate, and presents to the eye a mass of broken, jagged rocks upon which no vegetation exists except a few stunted weeds. The rocks are sharp, angular masses which, becoming detached by the operations of natural causes, roll down upon the more level parts of the islet and cover it with irregular bowlders. Notwithstanding that it is the outcropping of an immense dike of granite, the condition of the superficial parts is such that it could be separated into small fragments by a pick or crow-bar. It is the most desolate island on the coast, although the home and breeding place of vast numbers of sea-lions and myriads of sea fowl. The sea-lions are protected by law, as the islet is within the limits of the city and county of San Francisco, but the complete control of the island is held by the Light-house Engineer, and boats can not land on the island without his permit. The gathering of sea-fowl eggs and the killing of sea-lions are not permitted.

The principal peak on this island is near the northeast point; north-northwest (N. NW.) from this peak is the *Sugar Loaf Rock*, which is a rounded, almost vertical, rocky islet, nearly two hundred feet above the sea, with its summit generally whitened by the deposit of birds. The *Maintop* is the peak at the western part of the island, and is two hundred and thirty feet above the sea. This maintop part is in reality separated from the eastern part of the island by a narrow, rocky gorge cut through from north to south, but impassable to boats. The north side of the island is bordered by six small rocky islets, or rocks, bunched together with the Sugar Loaf farther north, but only three hundred yards from the main island. These rocky islets form with the island shore *Fishermans' Cove*, about one hundred and twenty yards in extent, with a rocky bottom anchorage in eight fathoms where the light house tender lies to discharge her supplies, etc., and where the fishermen and the egg hunters formerly resorted. There is a mooring buoy in eight fathoms for the light house steamer in this bay to which she makes fast. In the south part of this cove is the very contracted *North Landing* with a shell beach at its head. The rocks that formerly existed at the mouth of this landing place have been blasted away, and it is now an excellent beaching place. A derrick on the west side is used to hoist the supplies from the boats. Sometimes landing can not be had here for a month.

On the east side of the island is a long, narrow cut opening to the southeast where landing is sometimes effected. It is known as the *East Landing*. Just northeast of the Maintop is Fisherman Cove with a beach at its head; but landing can not be had here. Off the southeast side of the island, about one hundred and eighty yards, lies *Seal Rock*, one hundred feet in elevation and two hundred yards long. The southwesternmost point of the island is known as Indian Head from a fancied resemblance to an Indian lying down.

In very heavy southeast weather the sea breaks with the wildest fury and at times throws great volumes half way up the Sugar Loaf, whilst the spray occasionally goes quite over the island. Huge saw-logs have been found cast on the rocks thirty feet above high-water after such storms.

Vessels from the westward running for the Golden Gate in good weather should keep well southward of the island, passing it within the distance of a mile in not less than twenty fathoms of water, and at two miles in forty fathoms. Vessels may also safely pass midway between the Southeast and the Middle Farallon in eighteen fathoms, or midway between the Middle and the North Farallones in thirty-six fathoms; but the more prudent course is to keep well southward of the Southeast Farallon. At night and in thick weather vessels should always keep to the southward of the island. For other information on this subject see the Sailing Directions for approaching the coast in thick weather, pages 212–215.

The islands are frequently enveloped in fog, and, therefore, in approaching them in thick weather the utmost care and vigilance must be observed, the more especially as the precise set of the ocean currents in the vicinity have not been determined. A few miles westward of the island the currents have been found running to the southward even against light southerly winds.

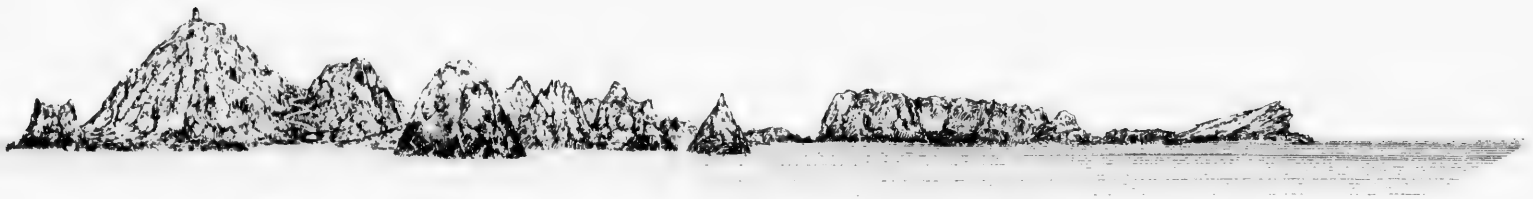
Dangers.—The Middle Farallon may be considered one of the dangers in the approaches to the Southeast Farallon. It lies northwest by north (NW. by N.) two and one quarter miles from the Light-house on the Southeast Farallon, and the depth between them is about eighteen fathoms over a moderately uniform bottom of coral and broken shells. From the extreme northeast point of the Southeast Farallon the Middle Farallon bears northwest (NW.) one and three miles; and even this width of the passage is decreased by the sunken rock off the Middle I

The rock which was formerly reported by pilots and the light-keeper to exist about between the Southeast and the Middle Farallon, and supposed to be a bayonet rock w

North Farallones,
NW. by W. ¼ W., 4¼ miles.

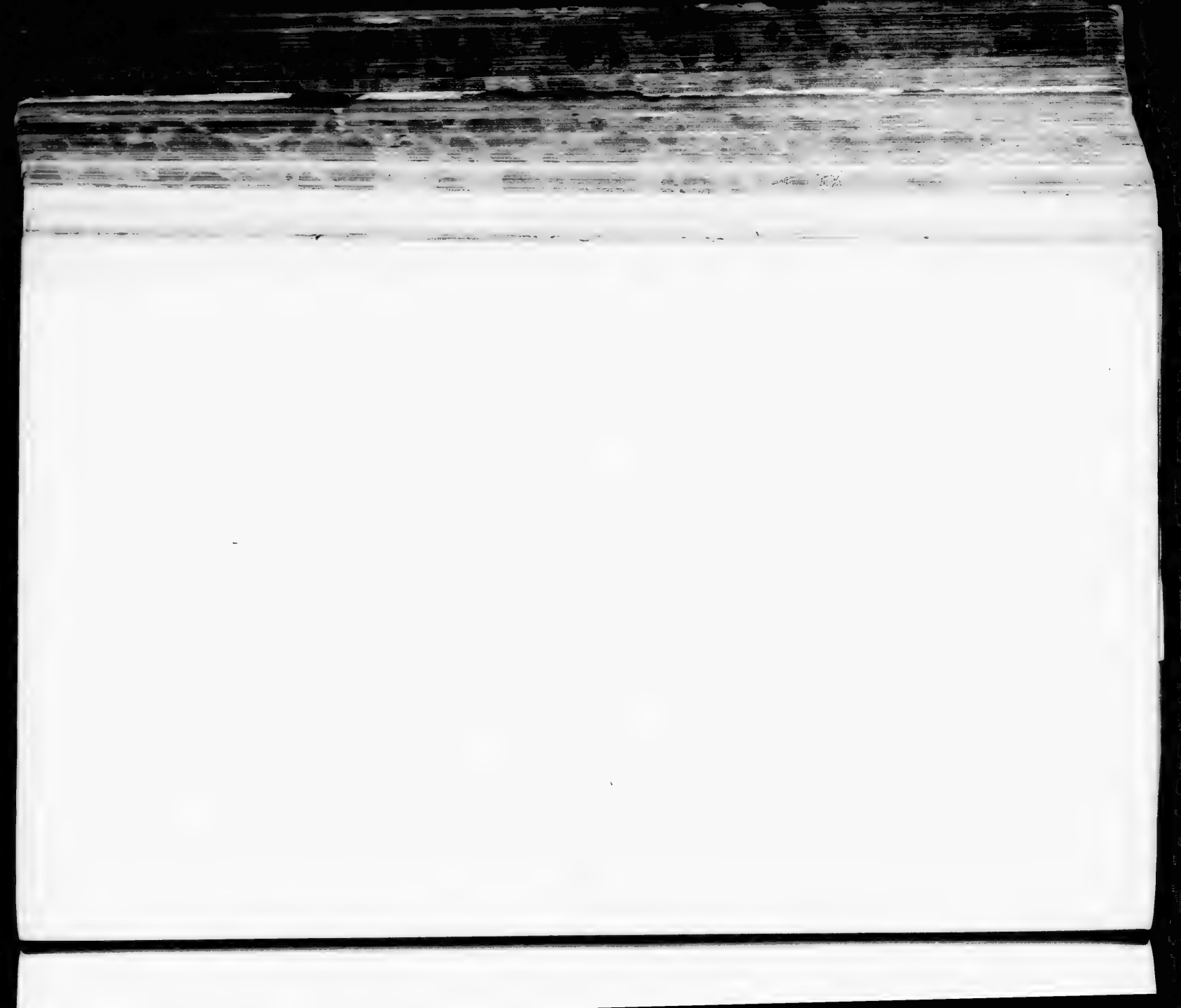
Arch.

Southeast Farallon Light-house, NW. 2¾ miles.



Boat Landing
Southeast Farallon Light-house, S. ½ mile

Southeast Farallon Light-house, W. by S., estimated 5 miles.



Middle Farallon, NE. ¼ N., 2 miles.

Fog inside.

Southeast Farallon Light-house, E. ¼ N., 3 miles

four fathoms upon it, has not been found. But, upon the bearing and angle of depression given by the Light-keeper for this break, a rock with five fathoms upon it was located near the Middle Farallon. See page 201.

Hurst Shoal off the Southeast Farallon.—This is a shoal, rocky spot off the southeast part of the island and about on the line of the fifteen-fathom curve. It lies five-eighths of a mile south fifty degrees east (SE. ½ E) from the Light-house on the island, and has upon it irregular depths of six to ten fathoms over a bottom of coral, broken shells, and rocks. On the outside it deepens rapidly to sixteen and eighteen fathoms, and on the inside to thirteen and fifteen fathoms. The diameter of the patch within the ten-fathom curve is about fifty yards and the shape nearly circular. The sea breaks upon this spot only in exceptionally heavy weather when a large swell and conflicting currents conspire.

The Light-house keeper of the Southeast Farallon Light reports that during the whole of December 26, 1888, the swell broke upon the Hurst Shoal at intervals of three to ten minutes. The southwest wind was light and the swell came from the westward. The breaker ran for about two hundred yards, then expended itself in white water, which showed as an area of foam fifty to sixty yards square. This is the second time since July, 1888, that the shoal has shown a break.

It is also reported by some of the Light-house keepers on the Southeast Farallon that a break has been seen on the Hurst Shoal about the position of the six-fathom spot thereon. It has been seen to break three or four times in succession during a heavy swell from the westward when there was little wind.

This danger was first reported in 1875, and the locality subsequently examined in detail. A vessel will rarely approach so close to the island except unintentionally in thick or foggy weather; but to avoid it do not approach the island from the southward within three-quarters of a mile when the Middle Farallon is shut in behind the Southeast Farallon. Whenever the Middle Farallon can be seen on either side of the Southeast Farallon there is no known danger.

To the westward of the Southeast Farallon a depth of thirty fathoms is found at one mile, forty-five fathoms at two miles, fifty fathoms at three miles, and two hundred fathoms at five miles; one thousand and fifteen fathoms is the depth at twenty-two miles, and one thousand seven hundred and twenty-six fathoms at twenty-eight miles, the latter sounding west-southwest (WSW.) from the island. To the northward, eastward, and southeastward the depth is twenty-five fathoms within a mile, and thence increases very regularly and slowly to thirty fathoms at three to four miles; thence towards the land it decreases very regularly up to the Bar of San Francisco.

For deep-sea soundings off the Gulf of the Farallones see page 163; and for the approaches to the island see Sailing Directions.

The extended and detailed examination around the island by the U. S. Coast and Geodetic Survey has been published on the general chart of the approaches to San Francisco. This chart embraces the coast from Bodega Head to Point Pinos, and gives the surroundings of the Farallon Groups, etc.

Several characteristic views are published herewith.

One of the San Francisco pilot-boats cruises off the island.

The ship *Lucas* was wrecked on this island in a fog November 9, 1858, and twenty-three lives lost. The ship *Franconia* was lost in Breaker Cove (northwest shore) in 1882, and the ship *Bremen* was lost on the south shore directly under the Fog-whistle in 1883.

Tides at the Southeast Farallon.—The Corrected Establishment, or mean interval between the time of the Moon's transit and the time of High Water, is X^h 37^m, and the difference between the greatest and least intervals is 1^h 16^m. The mean rise and fall of tides is three and six-tenths feet; of spring tides four and four-tenths feet; and of neap tides two and eight-tenths feet. The mean duration of the flood is 6^h 18^m, and of the ebb 6^h 09^m.

To find the times of high and low waters, first compute them for San Francisco, or take them from the published tide tables, and then to these numbers apply the following corrections to reduce them to the Farallon: Subtract 1^h 27^m for the time of high water, and subtract 1^h 05^m for the time of low water; add one-tenth of a foot for height of high water, and add one-tenth of a foot for height of low water. This will give about one hour for the march of the tide from the island to the bar of San Francisco.

THE SOUTHEAST FARALLON LIGHT-HOUSE.

The structure is a tower, the frustum of a cone, standing on the highest peak of the island near its northeast shore. It is built of brick, seventeen feet in height, and is surmounted by a

lantern painted red, of which the center is twenty-nine feet above the base of the tower. There is an iron balustrade just under the gallery around the lantern. The illuminating apparatus is of the first order of the system of Fresnel. It was established in 1855, and from sunset to sunrise exhibits *a revolving white light showing a prolonged flash of ten seconds every minute* throughout the horizon. The time of the flash varies slightly on different nights. In 1859 we found the average time thirteen seconds. In 1884 we observed the time of flash thirteen and a half seconds, and of the dark interval forty-three and a half seconds. The focal plane is three hundred and sixty feet above the mean level of the sea, and the light should be visible in a favorable state of the atmosphere from a height of—

10 feet at a distance of 25.4 miles.
20 feet at a distance of 26.9 miles.
30 feet at a distance of 28.1 miles.
60 feet at a distance of 30.7 miles.

It is visible from the deck of a vessel in the Golden Gate.

At near distances, under favorable circumstances, the light will not wholly disappear between the intervals of greatest brightness. It is plainly visible from Station Sulphur Peak, distant sixty-four and four-tenths miles, and thirty-four hundred and seventy-one feet above the sea.

The geographical position of the Light-house, as determined by the Coast and Geodetic Survey, is:

Latitude	37°	41′	51″.4 north.
Longitude	123°	00′	07″.0 west.
Or, in time	8h	12m	00s.5.

The magnetic variation was 16° 40′ east in January, 1885, with a yearly increase of 0′.4

The bearings and distances to prominent objects from the Light-house are as follows:

Point Arena Light-house	N. 41° W.	83	miles.
Bodega Head	N. 21° W.	36	miles.
Point Reyes Light-house	N. 20° W.	17¾	miles.
Noonday Rock Bell Buoy	N. 72½° W.	9¾	miles.
The North Farallones	N. 66° W.	5½ to 6½	miles.
The Middle Farallon	N. 57° W.	2½	miles.
Point Bonita Light-house	N. 56¼° E.	23½	miles.
Fort Point Light-house	N. 58° E.	25½	miles.
Whistling Buoy, in 17 fathoms off San Francisco Bar	N. 64° E.	16½	miles.
Point Montara Fog-whistle	S. 82½° E.	24½	miles.

FOG SIGNAL ON THE SOUTHEAST FARALLON.

A first-class steam-siren or fog-whistle was placed on the southeast part of the Southeast Farallon on September 20, 1880. It is located on the low and moderately flat part of the island, and in two hundred and seventy-five yards south eighty-two degrees east (S. 82° E.) from the Light-house. Water-shed, coal shed, and cisterns, painted white, stand behind it. The siren stands about forty-five feet above the sea, and during thick and foggy weather sounds *blasts of ten seconds duration at intervals of forty-five seconds.*

The high, rocky part of the island extends round from north forty degrees east (N. 40° E.) by the west to south seventy two degrees west (S. 72° W.), and it is doubtful if the whistle can be heard beyond these high rocky peaks and ridges, especially as they are to windward during the prevailing northwest winds. The only exceptions are the three narrow breaks leading to Breaker Cove, and two gulches which lie west by south (W. by S.) from the station; through these gaps the whistle has been heard three miles. On the south and east it is possible that Sugar Loaf Rock, one hundred feet high, may somewhat interrupt the sound from south to south southeast (S. to SSE.)

We have no authentic reports of the distance at which the whistle can be heard; as there is such variability of distance under apparently similar atmospheric conditions that it would be difficult to fix any limit.

It should be noted that the fog-whistle of 1859, operated by wave action, was reported destroyed by the waves after 1871.

THE MIDDLE FARALLON.

This is a single black rock, between fifty and sixty yards in diameter and rising two hundred feet above the water. It lies north fifty seven and a half degrees west (N. 57½° W.), northwest

118 feet. 91 feet. 155 feet. 108 feet.

N. 60° W., 1 mile. The North Farallones, N. 45° W., ½ mile

24 feet 118 feet.

The Northwestern Islet, N. 7° E., distant ½ mile. The North Farallones.

Broad; 20 fathoms. The Southeastern Group. 108 feet. 155 f

. 108 feet. Breaker. 21 feet.

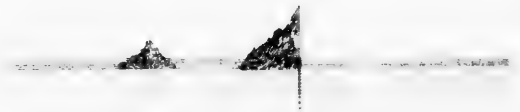
h Farallones, N. 45° W., ⅛ mile. N. 30° W. N. 25° W.

The North Farallones.

Hooper Passage, 710 yards wide.

astern Group. 108 feet. 155 feet. 91 feet.

N. 60° W., 1



24 feet

10 yards wide.

The No

Broad: 20 fathoms.

91 feet.

North Farallones, NW. ¼ N., 4 miles.

Point Reyes (as an island), N. ¾ W., 17 miles; fog inshore.

Middle Farallon, NE. ¼ N., 2 miles.

Middle Farallon, S. by W. ½ W., 1 mile

North Farallones, W. ¼ N., 4 miles.
91 feet. 155 feet. 108 feet. 118 feet.

11 feet. North 80° E. 118 feet. The North Farallones, E. ¼ mile. 108 feet. 155 feet. 91 feet.

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by west (NW. by W.), distant two and a quarter miles from the Southeast Farallon Light-house, and north forty-five degrees west (N. 45° W.), one and three-quarters miles from the extreme northwest part of the Southeast Farallon.

In foggy weather this Farallon is a danger to vessels approaching the Southeast Farallon. (See page 198.)

Dangers.—Off the Middle Farallon lies a *sunken rock*, upon which the break can be seen only at extreme low water, when a long, heavy swell is rolling in from the northwest. At such times there is a decided break recognized by the light-keeper, from whose approximate pointings the actual position of the danger was discovered.

This rocky ledge has a depth of five and one-quarter fathoms upon it, with rocky bottom approaches shoaling regularly to the summit, although it is rather steeper on the northwest side. The locality was carefully dragged in June, 1874, when the following bearings and distances were determined to locate its position:

The Middle Farallon bears	N. 25° E.	0.4 mile.
Southeast Farallon Light-house	S. 67½° E.	2.3 miles.

The geographical position of the Middle Farallon is:

Latitude	37° 43′ 31″.6 north.
Longitude	123° 01′ 56″.8 west.

The magnetic variation, January, 1885, is 16° 40′ east, with a yearly increase of 0′.4.

From the Middle Farallon the Light-house on the Southeast Farallon bears south fifty-seven and a half degrees east (S. 57½ E.), distant two and one-quarter miles; and the North Farallones bear north seventy degrees west (N. 70° W.), distant three and three-fifths miles.

THE NORTH FARALLONES.

This dangerous group of islets, unmarked by any aid to navigation, lies nearly in line west-northwest and east-southeast with each other, and also with the Middle and the Southeast Farallon.

There are five principal islets in the group, the four large ones having a roughly pyramidal appearance, as their name denotes. The whole of them, with the immediate dangers around the southeast cluster, are comprised within a space four-fifths of a mile west-northwest and east-southeast by one-fifth of a mile in breadth. They are wild, rocky, precipitous, and almost inaccessible.

The northwesternmost islet is triple-headed, and has two small, low, rocky islets on either side of the northeast peak, which is one hundred and eighteen feet high. From the south-southeast and north-northwest one of these, small rocks, twenty-four feet high, show just clear of the triple-headed mass as a small pyramidal islet.

The southeastern cluster of this group is composed of four islets, and is separated from the northwestern islet by a passage one-third of a mile wide, with twenty fathoms of water in the middle. There was a large swell running when we passed through twice, and there was no sign of breaking water up to the edge of either islet. We have named this *Hooper's Passage*.

In this southeastern cluster, the two islets nearest the northwest islet are quite close together and generally seen as one. They are very precipitous, and the southern face of the western one is very nearly vertical to the summit, which is one hundred and fifty-five feet above the sea; the other is one hundred and eight feet high. Between these two islets and the southwestern one there is a gap of three hundred yards filled with visible and sunken rocks. A very heavy breaker lies three hundred yards to the southeastward from this southwest islet. The fourth islet of this cluster lies three hundred yards to the southeastward of the others; it is only fifty yards in length and twenty-one feet above the water, with dangers around it.

The thirty-fathom curve lies close around this group of the North Farallones, being half a mile off the southeastern cluster and a quarter of a mile off the northwestern islet, with the deeper water on the southwestern side of the group. The twenty-fathom curve is about four hundred yards from these islets, so that a vessel in thick weather may be close upon them unexpectedly even when the lead is kept going.

Although these islets seemed inaccessible, and they are so with any swell on, yet in our cursory examination of them we saw the marks of the gull-egg hunters upon two of them.

The geographical positions of the principal heads are given from the last examination of t . Coast and Geodetic Survey .

Islet.	Height (feet).	Latitude (north).			Longitude (west).			Length (yards).
Northwest.....	118	37	46	11	123	06	23	200
Highest, middle	156	37	45	54	123	05	53	150
Southwestern. ..	91	37	45	43	123	05	53	150

The extent of the two middle islets lying southwest and northeast is two hundred and eighty-five yards. The northern islet lies north sixty-five and a half degrees west (N. 65½° W.) six and two-thirds miles from the Southeast Farallon Light-house; and from the Point Reyes Light-house it bears exactly south, distant fourteen miles.

The course from the northwestern islet to the Whistling Buoy off the San Francisco Bar is north seventy-five and a half degrees east (N. 75½° E. or E. by N. ¾ N.) and the distance twenty and a half miles.

One mile broad off the group of the North Farallones to the southwest there is a parallel submarine ridge having twenty-seven and twenty-nine fathoms upon it; and two and a quarter miles southwest of the group the fifty-fathom line runs parallel with the general range of the different groups. The two-hundred-fathom line is only four miles to the southwest of the islets.

Inside the North Farallones the forty-fathom curve is about one and a quarter miles distant, and preserves a very regular bottom east of a northeast line; towards Point Reyes is a slightly deeper bottom of forty-five fathoms.

Towards the Middle Farallon, bearing south seventy degrees east (S. 70° E.), distant three and three-fifths miles, the depth is quite uniform at thirty-six fathoms over a bottom of gravel and broken shells. No dangers have been found or reported in this opening between the groups.

Northwestwardly from the islets the bottom is somewhat irregular, from thirty-one to forty-one fathoms for three miles to the Noonday Rock, which lies north eighty-three degrees west (N. 83° W.) from the northwestern islet.

For sailing directions in approaching these islets, see pages 203–205.

Views of these islets are given from several directions, especially from the position of Noonday Rock. The general charts of the Coast Survey, from Point Pinos to Bodega Head, and from the Golden Gate to Point Arena, exhibit the characteristic soundings about the islands and their relation to the coast.

These groups of islets were doubtless seen by Cabrillo and Ferrelo in November, 1542, but are not mentioned in their narratives. (See remarks on Gulf of the Farallones.)

Sir Francis Drake is the first that specifically mentions "certain isles lying a little without the harbor" where he refitted and "trimmed" his ships, "and by them the islands of St. James wherein are plenty of seals and fowls." The former group is doubtless the North Farallones, and the latter the Southeast Farallon, with its several high peaks, where he landed and supplied himself with sea-lion meat in July, 1579.

Admiral José Cabrera Bueno Gonzales says, 1734, that to the south-southwest of this port (Drake's Bay) there are six or seven white Farallones, etc., and in coming down the coast from Cape Mendocino these Farallones are a good sign to recognize Point Reyes and the harbor behind it.

Their geographical name, Farallones de los Frayles, does not appear in Zuniga, Venegas, or Cabrera Bueno. Miguel Constanzo reports seeing the Farallones from Montara Point in 1769.

In October, 1775, Heceta designates them the Islets of San Francisco.

Palou, in his Noticias de la Nueva California, calls them "Los Farallones del Norte," 1775.

In 1790 Fidalgo calls them "Los Farallones de San Francisco."

They probably received their present name after the voyages of Bodega and Maurelle, made under the orders of Bailio Frayle Don Antonio Bucarelli y Visera although it has been suggested that they were named in honor of the Frayles or Friars, who made the discovery of the Bay of San Francisco by land in 1769.

Noonday Rock.—For description of this rock and the buoy marking the locality, see Dangers in the Approaches to San Francisco Bar, pages 203 and 204.

Southeast Farallon Light-house, W. ¼ S., 6¼ miles.

North Farallones, 157 feet, W. ¼ N., 12 miles.

The shores of the Gulf of the Farallones (from inside the Farallones).

Point Reyes Light-house, Drake's Bay, NW. ¼ N., 18 miles.

Drake's Bay.

Double Point.

Ballenas Bay.
Duxbury Reef.

Mount Tamalpais, 2,604 feet,
NE. by N. ¼ N., 19 miles.

North Farallones, E. by S., 3 miles.

Middle Farallon.
From Noonday Rock.

Southeast Farallon, E. by S. ½ S., 9¼ miles.

Mount Helena, 4,343 feet

Point Reyes Light-house, N. by E. ½ E., 14 miles.
From Noonday Rock.

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DANGERS IN THE APPROACHES TO SAN FRANCISCO BAR.

The groups of the Farallones Islands may be placed among the dangers because they lie in the approaches, although their height and size make them easily avoided in good weather, and even in moderate winter weather. In heavy fogs they are dangers. The Southeast Farallon is elsewhere described in detail with the Light-house and fog-whistle. The Middle and the North Farallones are also fully described. The two latter have no aids to navigation. The greatest hidden danger to navigation is Noonday Rock off the North Farallones, because it is three miles from them; has bold water all around it, and seldom breaks. This danger is therefore described out of the usual order we have laid down.

NOONDAY ROCK.

This is the principal and farthest outlying hidden danger in the approaches to the coast near San Francisco Bay. Even in good weather the locality is particularly to be avoided, because the sea seldom breaks upon the rock except in very heavy weather with low tide. In thick and foggy weather it is especially dangerous to large vessels.

This danger lies four-fifths of a mile south of the prolongation of the line from the Southeast Farallon through the northwesternmost of the North Farallones, and three miles north eighty-three degrees west (N. 83° W.) from the northwesternmost islet.

It is on the line of the western peak of the northwesternmost of the North Farallones on with the peak of the easternmost (one hundred and eight feet high) of the same group. This is a good range to find it and to avoid it.

The Noonday Rock was supposed to be a single bayonet rock with three and a half fathoms upon it at low water, springing from the Fanny Shoal; but when the operations for removing this rock were undertaken in 1875 it was found that *two other sharp-pointed rocks* existed in the immediate locality. One of these rocks was reported to have only two and a half fathoms upon it, and the other four and a half fathoms. The former was the larger and, by estimation, was seventy feet long by thirty feet wide above the four-fathom line. If this is so, it is wonderful that it is not seen to break regularly in the long northwest swell. The original Noonday Rock was destroyed in 1875 by the United States Engineers.

Late in 1886 an examination was commenced to obtain more information. The rock was found to be a narrow ledge, about sixty yards long east and west, within the four and a half fathoms line. It was very narrow, and at the eastern end there was found a point with four fathoms of water upon it. Under certain conditions, part of the rock mass could be seen through the water. This rock dropped off very suddenly on all sides, but more particularly on the north slope, where the thirty fathom curve is only seventy five yards distant. To the southward the twenty-five-fathom curve was three hundred and fifty yards distant. About seven hundred and fifty yards to the west by south (and, of course, beyond the buoy) a sounding of nineteen fathoms was obtained with thirty fathoms close to it.

In September, 1879, the ship *Alaska*, drawing twenty-one feet of water and with the tide four feet above the plane of reference of the soundings on the chart, was approaching the coast in partially foggy weather, with the North Farallones visible at times, and reported that the vessel was standing east when the Noonday Rock* was made square ahead. The course was then changed to northeast (NE.) to clear the rock and more sail made, which occupied some time. The vessel then struck three times, damaging her false keel, breaking two or three planks, etc.

This would indicate that there was another sunken rock, but the Mammoth Buoy was then in position different to that assigned to it on the chart, and the change of course of the ship brought the vessel directly upon the Noonday Rock itself. So that it may be said with great, if not absolute confidence that there is no other danger in this vicinity. It was the report of the *Alaska* indicating a new danger that caused the late examination, and also the placing of the buoy so near the rock as at present.†

These rocks should be removed as the original Noonday Rock was.

Fanny Shoal.—The Noonday Rock forms the culminating point of the Fanny Shoal or Bank. The bank itself, reckoned inside the thirty-fathom line, is probably one and a half miles long westerly and east-southeast, by half a mile wide. Throughout the bank the soundings are very irregular from nineteen fathoms, and the indications are rocky bottom with gravel. To the south-

*This is doubtless referred to, unless the rock itself was breaking, of which no mention whatever was made.

†See page 204 for location of bell-buoy subsequent to December 1, 1888.

ward of this bank the bottom falls away very rapidly, reaching fifty fathoms in one mile from the Noonday Rock and one hundred fathoms in three miles. To the west-northwest the fifty-fathom curve stretches out four and a half miles from the rock; and midway between Noonday Rock and Point Reyes the greatest depth of water reached is forty-eight fathoms of water over sand and shells.

Vessels have such a wholesome dread of this danger and of the North Farallones that they always incline to keep near Point Reyes Head.

The geographical position of Noonday Rock has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	37° 47′ 25″ north.
Longitude	123° 09′ 55″ west.

The magnetic variation is 16° 40′ east, January, 1885.

The following bearings and distances are given from the Rock to prominent objects:

Point Reyes Light-house	N. 12½° E. distant 14 miles.
Northernmost islet of North Farallones	S. 83° E. distant 3 miles.
Point Boneta Light-house	N. 70¾ E. distant 30⅝ miles.
Whistling Buoy off San Francisco Bar	N. 79½° E. distant 23¼ miles.
Southeast Farallon Light-house	S. 71° E. distant 9⅞ miles.

The U. S. Coast Survey charts of the approaches from Point Pinos to Bodega Head, and from the Golden Gate to Point Arena, give the characteristic soundings of the vicinity of Noonday Rock and its relation to the Farallones.

One of the views given was taken from Noonday Rock and shows Mount Helena open four degrees to the westward of Point Reyes Light-house. This mountain is only seen in clear weather bearing north eight degrees east (N. 8° E.), fifty eight miles distant: it is four thousand three hundred and forty-three feet above the sea. The second view on same page shows the general relation of the North and South Farallones, with Montara Mountain in range with the North Farallones.

Noonday Rock—Bell-buoy.—The bell-buoy having broken adrift about December 1, 1888, it has been replaced by another, which has been moored in twenty-four fathoms of water, over a rocky and uneven bottom. It lies about eight hundred yards west quarter north (W. ¼ N.) from the rock, and has the rock in range with the black hummock of the point of the northwesternmost Farallon on with the center of the easternmost islet of the same group. This is the same range on which the former buoy lay, but farther from the danger.

Noonday Rock Buoy—Derelict.—The bell-boat which broke adrift from its moorings near the Noonday Rock about December 1, 1888, has been seen and its position located several times. By the end of January it was seen a few miles southwest of Cape Orford, and was then drifted to the southwestward by heavy northwest gales. Early in February it was seen moving again to the northward.

Directions for avoiding Noonday Rock.—In the description of the Southeast Farallon, and in the directions for approaching San Francisco, we have heretofore advised vessels approaching the Golden Gate at night and in thick weather to keep to the southward of the Southeast Farallon Light. This advice has more significance since the discovery of Noonday Rock, and should be followed. With Point Reyes and the groups of the Farallones in sight, vessels bound in and running between them and the point, should bring the western head of Point Reyes to bear northeast to the northward of north-northeast (NNE.), until the North and the Southeast Farallones are in range; then bear away for the Golden Gate. When Point Reyes bears North-northeast (NNE.) and the North and Southeast Farallones are in range, the depth is forty fathoms, and the Noonday Rock will bear east half south (E. ½ S.) about two and one-half miles distant and eight hundred yards from the buoy.

Coming from the northwestward at night, vessels should not bring the Southeast Farallon Light to bear anything east of southeast by east (SE. by E.), which will clear the rock by two and a half miles and the North Farallones by one mile. But in coming from the northwestward, vessels generally endeavor to make Point Reyes Light because the approaches to it are over more regular bottom and there are no outlying dangers off that head.

The existence of the Noonday Rock ledge was first made known to us in April, 1860, it having been discovered by Captain George Simpton on the 13th of March. The weather was calm, and

the pilot-boat, drifting with the current, was fishing off the North Farallones in forty fathoms of water. Suddenly the line slackened, and the depth rapidly decreased to ten and finally to nine fathoms, when it increased again to the first depth. No other examination was made, as the boarding-boat was fishing some miles distant. The North Farallones bore east by south (E. by S.) at an estimated distance of five miles; the single shore-range taken was unavailable for plotting.

On the 2d of January, 1863, the clipper ship *Noonday*, drawing twenty-one feet of water, struck twice upon one of the points of the rock forming the apex of the ledge, passed over it, and within an hour sank in forty fathoms of water. At the time of her striking, the weather was clear, sea smooth, but with a very large swell from the northwest, and the wind from the northwest carrying her towards the Golden Gate about nine or ten miles an hour with everything set. She reported the rock eight miles from the North Farallones, which bore east by south half south E. by S. ½ S.).

On the 29th of January the position of this danger was first accurately determined by the Coast and Geodetic Survey, and notice thereof immediately published.

In April, 1875, one of the sharp peaks was blown away under the direction of the Engineers of the U. S. Army, but no proposition has been made to destroy the others. It was in 1886 that the last examination located the ledge as it is now known.

DUXBURY REEF.

This danger in the approaches to San Francisco Bar is on the immediate shore-line, and it has been fully described under the head of Duxbury Point and Reef, page 192.

DUXBURY REEF BUOY.

To mark the dangerous reef which makes out one mile southeast from Duxbury Point, a *first-class can-buoy* with *red and black horizontal stripes* has been placed in twelve fathoms of water, rocky bottom. There is slightly deeper water eastward of it, and the bottom is not very regular for two miles to the eastward. This buoy must also be regarded as an aid to the navigation of San Francisco Bar, because it is a point of departure for vessels from the northwestward entering through the Boneta Channel.

The buoy lies two and one-quarter miles south thirty-two degrees east (S. 32° E.) from the extremity of the bluff at Duxbury Point; three and two-fifths miles south fifty degrees east from Ballenas Point; and seven and seven-eighths miles north eighty nine degrees west (N. 89° W.) from Point Boneta Light house. From the bluff at the west side of the entrance to Ballenas Lagoon, near the Life-saving station, the distance is three and one-quarter miles and the bearing south eleven degrees east (S. 11° E.).

The Point Reyes, Southeast Farallon, and Point Boneta Lights are visible from this position; and a vessel one-quarter of a mile south of it is on the northern edge of the small arc of visibility of the electric light on Telegraph Hill showing through the low depression north of the old Light-tower on Point Boneta.

Vessels making this buoy can lay a course for the Whistling-buoy, for the Main Ship Channel, for the buoy on the west end of the Four-fathom Bank; or for the Boneta Channel by steering for Tennessee Cove until the range for the latter channel comes on.

To facilitate any of these operations the following bearings and distances from the buoy to these and other important objects are given, as follows:

Whistling-buoy, in 15 fathoms outside the Bar	S.	22½°	E.	6½	miles.
Main Ship Channel over the Bar	S.	46°	E.	5½	miles.
Black Buoy No. 1, off the west end of Four-fathom Bank	S.	61°	E.	4½	miles.
Tennessee Cove (for Boneta Channel)	N.	81½°	E.	6¼	miles.
And the range for the same channel on same bearing, distant				5½	miles.
Point Reyes Light-house	N.	78°	W.	17⅞	miles.
Double Point	N.	55½°	W.	6½	miles.
Ballenas Point	N.	50°	W.	3⅝	miles.
Westernmost part of Duxbury Reef, 5 fathoms	N.	45°	W.	1⅛	miles.
Tail of Duxbury Reef, in 3 fathoms	N.	11°	W.	1½	miles.
Point Boneta Light-house	S.	89°	E.	7⅞	miles.

SAN FRANCISCO BAR AND CHANNELS.

The bar off the entrance to the Bay of San Francisco has a general depth of five and a quarter fathoms, and ranges from three and three-quarters to eight and three-quarters fathoms. Its form is that of a horseshoe with the point of greatest convexity lying five and three quarters miles west by south one-quarter south (W. by S. ¼ S.) from Point Lobos. Reckoned within the six-fathom curves, the southern end of the bar springs from the low south shore about three and one-quarter miles south southeastward of the Seal Rocks off Point Lobos, where the great sand dunes merge into the northern end of the white cliff shore; then curves two miles west-southwest (W. SW.) to its southernmost limit, whence it continues to a point two and a half miles west of Point Boneta Light; there it shoals from five and three-quarters to four and three-quarters and three and three quarters, forming here the Four-fathom Bank. The northern and eastern end of the bar is directly abreast the outer cliffs of Point Boneta, and this is also the eastern end of the Four-fathom Bank. At the southern part, the bar is about one and one-quarter miles across, and five and two-thirds fathoms can be carried over it for two and three-quarters miles from the shore. At its western limit it is only one-fifth of a mile across where it has a depth of five and three-quarters fathoms; whilst west-southwest (WSW.) from Point Boneta it is one and one-third miles across, and shoals to three and three quarters fathoms. This latter part constitutes as already stated the "Four-fathom Bank," upon which the regular heavy northwest swell frequently breaks. In ordinary weather, however, it is crossed safely by all the smaller vessels and steamers from or to the northwest.

Reckoned within the six-fathom line the bar does not touch either shore because full six fathoms can be carried across the southern part one mile off the beach abreast the "Ocean Side House;" and eight and three-quarters fathoms through the Boneta Channel. The very minute and detailed examination of 1873 showed that the bar was essentially the same as the surveys of eighteen years earlier indicated. This late survey developed several spots on the bar having less than the average depth of water usually assigned to it; but these shoal spots may have existed at the time of the earlier survey. A tentative re-examination was made on the bar in 1884 when sixteen lines were run over the bar and two lines along the crest. The results confirm the previous surveys and indicate no shoaling.

The spots developed in the survey of 1873 are as follows:

I. A small spot having twenty-nine feet of water lies on the outer edge of the bar south eight degrees west (S. 8° W.), six miles from Point Boneta Light-house, and south twenty-seven degrees west (S. 27° W.) distant four and three-tenths miles from the Seal Rocks. A second spot, with thirty feet, lies four hundred and forty-three yards west half north (W. ½ N.) from the former. Bottom fine black and gray sand and mica.

II. A small, single spot, having thirty feet upon it, lies on the middle of the bar south seventeen degrees west (S. 17° W.), distant five and two-thirds miles from Point Boneta Light-house. There is a depth of thirty-three feet all around it.

III. A spot with thirty feet upon it lies on the outer edge of the bar south twenty-two degrees west (S. 22° W.), six miles from Point Boneta Light-house, and south forty-three degrees west (S. 43° W.), four and nine-tenths miles from the Seal Rocks. Other spots with twenty-nine and thirty feet extend half a mile northwest by west (NW. by W.) from this along the outer edge of the bar. The southwest side of this ridge is marked by the "South Shoal Buoy."

IV. A spot with thirty feet lies on the middle of the bar south thirty-three degrees west (S. 33° W.), five and two thirds miles from Point Boneta Light-house. Other spots with same depth, and forming part of a narrow ridge fifty yards wide, stretch for a quarter of a mile to the northwest one-quarter west (NW. ¼ W.), and parallel with the outer edge of the bar. Its northern limit is about half a mile southward of the range of Alcatraz and Fort Point Lights.

V. A patch with twenty-nine and thirty feet of water lies on the middle of the bar, which is here less than half a mile across, northward of the main ship-channel and off the western tail of the Four-fathom Bank. Its southern point is south fifty-eight degrees west (S. 58° W.) five miles from Point Boneta Light-house, and south eighty-two degrees west (S. 82° W.) five and a half miles from the Seal Rocks. It extends to the northward for one-quarter of a mile from this point.

With these exceptions the bar may be crossed from near the southern shore round to the western tail of the Four-fathom Bank in thirty-two to thirty-six feet of water; or within the arc from south nineteen degrees east to south sixty-three degrees west (S. 19° E. to S. 63° W.) reckoned from Point Boneta Light.

To avoid all the five-fathom patches south of the main ship-channel the following ranges are given as including them: The southern limit, Round Top on with Lone Mountain, or still better, Outer Seal Rock off Point Lobos on with the highest peak of Angel Island; and the northern

limit, north end of Alcatraz Island on with Fort Point. At night bring Point Boneta Light to bear nothing to the eastward of north half west (N. ½ W.) for the southern limit, and the range of Fort Point and Alcatraz Lights for the northern limit.

The spot numbered V should be especially avoided by deep vessels in heavy weather. As there are no ranges for marking it, vessels are apt to get too close to it when running for the best water over the main ship-channel. Pilots report that it has been touched several times. This of course can happen only when there is a large swell at dead low water.

The outer edge of the bar falls off quite rapidly from six to ten fathoms in an average distance of half a mile, and the bottom at that depth is softer than on the bar. Inside the bar the depth increases very slowly and regularly to ten fathoms in a distance of about three miles, and the bottom is harder than in the same depth outside.

THE FOUR-FATHOM BANK.

This is the northernmost part of the bar, and its eastern end lies one and one-quarter miles west southwest (WSW.) from Point Boneta Light. Thence it stretches to a distance of a little more than three and a half miles to the west by south (W. by S.) from Point Boneta in irregular humps having from twenty-three to twenty-seven feet of water upon it. Its greatest distance across north and south is three-quarters of a mile, about two and a half miles from Point Boneta. On the inside the depth increases gradually and slowly; on the outside it deepens to eight fathoms in less than half a mile. To mark this bank, two buoys have been placed upon it, one on its eastern end and one on its western end, as described under the head of Buoys off the Entrance to San Francisco Bay.

The swell on this bank from westerly weather is the heaviest towards the eastern extremity of the shoalest part, although the depth of water is nearly uniform at three and three-quarters fathoms for one mile.

Locally this bank is known as the "Potatoe Patch," which name is said to originate from the fact that the small schooners coming from Bodega and Ballenas Bays frequently lost part of their deck-load of potatoes while crossing it. We have frequently watched the lumber schooners crossing it near the western tail when it was breaking badly. The deck-load being well secured, there is little risk of losing it.

Although the bar may be crossed with absolute safety at any place during nine-tenths of the year, yet there are certain deeper places across it which have received special names, and for which particular directions are given.

The *Main Ship Channel* is used by all vessels from the westward and northwestward, because it has deep water, is the most direct, and has the shortest distance across. It is over one and a half miles wide, northwest and southeast, when Point Boneta Light bears from north thirty-eight degrees east to north fifty-six degrees east (N. 38° E. to N. 56° E.); and a depth of not less than thirty-two feet can be carried over it. But the best water is thirty-four to thirty-five feet, where the bar is less than five hundred yards across, and where the course for crossing is with the swell. In southeast gales the bar begins to break there later, and breaks less than over the other parts, except the Boneta Channel.

The whistling-buoy lies in fifteen fathoms on the line of Fort Point and Alcatraz Lights, two miles outside of this part of the bar, but near the southern limit of the Main Ship Channel, as above described. (See Sailing Directions and Description of Buoys.)

The *South Channel* is parallel with the low, sandy shore south of Point Lobos. Its inner edge is half a mile off the beach abreast the Ocean Side House, and it has a width of one and a half miles within which not less than thirty-four feet can be carried; and thirty-six feet can be carried throughout with Point Boneta Light-house bearing north by west one-quarter west (N. by W. ¼ W.). On this course lying only one mile from the beach, and one-third of a mile outside the five-fathom line, it is better to bring Point Boneta Light-house to bear north half west (N. ½ W.) and nothing to the west, and cross the bar in thirty-four feet of water for a distance of three-quarters of a mile. The swell rolls in parallel with the shore and sometimes quite heavily; nevertheless a vessel does not pitch or ascend in a heavy swell as she would in crossing by the Main Ship Channel. But if the bar is very rough, almost breaking, it is not prudent to cross it through the South Channel, as there is some danger of broaching to in the heavy swell, or being crowded on shore in attempting to keep away before the heavier rollers. At such times sailing vessels should cross by the

Main Ship Channel and steamers may enter by the Boneta Channel. There is no buoy to mark this South Channel nearer than the South Shoal Buoy. (See Sailing Directions for entering by this channel.)

The *Boneta Channel* lies close under the rocky cliffs northwest of Point Boneta Light-house, and between them and the eastern extremity of the Four-fathom Bank. Between the six-fathom lines on each side of the width of the channel, is one-third of a mile, and eight and three-quarters fathoms can be carried through it on a single direct course governed by a fore and by a back range. Steamers acquainted with the coast use it very frequently in rough weather, entering and leaving; and the British iron-clad *Zealous*, drawing twenty-six feet of water and dreading the Main Ship Channel, used it several times both ways from our directions. Some of the steamship captains running to the northward from San Francisco go out through the Boneta Channel, even in a very thick fog. They keep close under Point Boneta and are guided by the fog-whistle on it for their position. By doing so they not only gain in time, as this is the most direct channel when bound to the northward, but they also lessen the chances of collision with the numerous sailing vessels off the entrance, which rarely use this channel.

The Boneta Channel may doubtless be used to great advantage by sailing vessels entering the harbor under tow when a strong ebb current is running, as it has been found in a partial examination that there is an eddy-current setting in through the narrowest part of this channel when the current is running out through the Golden Gate and over the bar. This advice will especially apply when there are freshets in the rivers emptying into San Francisco Bay.

In a certain sense it ought to be the more popular channel, as the ranges for entering it are very conspicuous and not so far distant as for the other channels. Vessels are apt to keep too far over towards the tail of the Four-fathom Bank, as the cliffs look very near and forbidding when a vessel is on the range; but when the range is closely followed there is no danger.

In northwest weather, the approaches to this channel from the northward are smooth even if the Four-fathom Bank is breaking considerably. Three buoys now mark the Boneta Channel. (See Sailing Directions for vessels coming from the northwestward; and also the Descriptions of Buoys.)

This channel is locally known as the North Channel.

The *depth of water on the bar* is given for the datum plane of the U. S. Coast and Geodetic Survey, which is the average of the lower low waters of each day; but the peculiarities of the tides on this coast sometime develop a much lower tide than this average. During each month the lower low water may fall nearly one foot below the datum plane of the Coast Survey; and in extreme cases, once or twice a year, may fall nearly three feet below this plane. This is a very important consideration to vessels of deep draught, with a large swell on the bar.

The Tide Tables published one year in advance, with the normal times and heights of every tide of the year, give sufficient information to the navigator to advise him of the depth of the water on the bar if he has no pilot.

No change of bar.—The two surveys of the bar by the U. S. Coast and Geodetic Survey, although eighteen years apart (1855–1873), exhibit no marked changes in the location and depth lines of the bar or the depth of water upon it; and the tentative examination of 1884 fully sustains the integrity of the bar and its approaches. But it is not improbable that local changes may at times take place, and the general features be recovered after the abnormal causes cease. The existence of live shells in many patches on the bar, however, indicates its persistent character. Although there appears to be a slight increase of the depth of water on the Four-fathom Bank, yet the minute character of the last survey, and the fixed datum plane from the permanent tide-gauge, may have conspired to give an apparently slightly greater average depth of water than at the first survey. This minuteness of survey has developed several small spots on the narrow crest line of the bar where there is a quarter of a fathom less water than was supposed. These have already been described. This examination has also narrowed the breadth of the bar within the six-fathom curves southward of the Four-fathom Bank.

The bottom of the bar is formed of fine gray and black sand. From the western end of the Four-fathom Bank for four or five miles along the bar to the southward and eastward, and on the outer edge of it to eight fathoms of water, the lead will frequently bring up living pieces of the small flat echinus.* Outside the line of six fathoms, and on the Four-fathom Bank, the fine gray and black sand is mixed with fine specks of mica, and occasionally with mud in six to ten fathoms.

* Echina rachnius-excentricus.

Inside the bar are no mica specks and no indications of echinus, but the lead frequently brings up, in addition to the gray and black sand, broken and live shells about the size of a bean half an inch long.*

In June, 1874, a few dredgings were made on the bar to verify the survey of the previous year, when pieces of living echinus were again brought up from the bottom of the bar northward of the Main Ship Channel. In two positions, a mile apart, the vessel was moved across the bar towards the shore on a line at right angles to the bar, and the dredge was hauled in at intervals; at every haul it brought up several specimens, living and of different sizes, but all of the same species as previously found. One dredging was made on the western end of the Four-fathom Bank in a heavy swell, but nothing found. Outside the six fathoms, and especially about ten fathoms, the character of the bottom is softer than on the bar itself; and inside of six fathoms the bottom is harder.

In 1884 a tentative examination, carrying lines across the bar in many places, verified the existence of the shells above mentioned and the character of the bottom.

In watching the bar from Point Lobos during the incoming large flood we have occasionally seen broad stretches of discolored water a mile long in the direction of the South Shoal, indicating that the bottom had been disturbed by the heavy swell.

In approaching the bar of San Francisco a peculiar feature in the color of the water has been noticed at times. Some miles outside the bar is an underlying stratum of dark-brown water, which shows very plainly in the wake of a deep-sea vessel, which will displace the top stratum of light-blue or mud-colored water. At the same time a pilot-boat, drawing only nine feet, would make no such wake. At other times this dark-brown water reaches the surface, and the boundary line between it and the ordinarily colored water is quite distinctly marked, having a movement in it like that of a tide-rip. The pilots report that they sometimes find this dark-brown water as far inside as the Heads." In 1857 we found the water of Tomales Bay a dark liver color; but the cause in neither case is unknown.

Comparisons in depth of water, etc., on the bar with the examinations made previous to 1855 can not fairly be instituted to determine the condition of it in the times of Vancouver, 1793; Beechey, 1827 and 1839, and Ringgold in 1850, because we do not know their planes of reference, or the exactness of their work. Vancouver crossed over the Four-fathom Bank. Beechey reports only four and a half fathoms where he crossed, presumably over the southern edge of the Main Ship Channel; and his vessel stirred up the sand on the bar. His survey indicates more water, but is not sufficiently detailed for comparison. Ringgold has no fractions of fathoms and very few soundings.

BUOYS OFF THE ENTRANCE TO SAN FRANCISCO BAY.

The buoys off the entrance to San Francisco Bay are of two kinds; leading in, or mid-channel buoys, of which there are two; and buoys marking shoals, rocks, or dangers. Of the latter class there are three on the bar proper, two in the approaches to it, marking Noonday Rock and Dux Reef, and one inside the Heads marking the ledge off Fort Point. The Noonday Rock and Dux Reef Buoys have been described under the head of Dangers in the Approaches to the Bay, and the Fort Point Ledge Buoy under the head of Dangers in the Golden Gate.

The Automatic Whistling Buoy outside the Bar.—This buoy has *black and white perpendicular stripes* and is placed in fifteen and three-quarters fathoms of water at extreme low tides, over sandy bottom, near the southern edge of the Main Ship Channel over the Bar of San Francisco and may be passed close-to on either hand. The whistle is sounded by the action of the waves and gives from twenty to thirty continuous blasts in a minute. In an ordinary smooth sea the sound can be heard at a distance of a mile, which should be particularly borne in mind if a thick fog prevails under such circumstances; in a heavy swell it can be heard when a vessel is six or seven miles to leeward, and it has been plainly heard one mile directly to windward of it. In thick weather the Boneta Fog-whistle can be distinctly heard at the buoy.

Locally this buoy is called the "Bull" because it does not whistle but roars, and during a strong breeze it varies its note from a roar to a sound more like an ordinary steam-whistle; it also sounds more frequently than in mild weather.

It is on the line of Fort Point and Alcatraz Island Lights (or so intended in placing it). Both lights can be seen from it in clear weather from the deck of a vessel, the Alcatraz Light showing the brighter.

* Olivella intorta, Carpenter.

The buoy lies two and one-quarter miles outside the six-fathom line of the bar, and vessels in passing it for the Main Ship Channel should keep between one third and one-half mile northward of it, thus opening Alcatraz Light north of Fort Point, to cross the bar in the deepest water and at its narrowest part.

From this Whistling Buoy we have the following bearings and distances to prominent objects:

Point Boneta Light-house	N. 45	E.	7¾ miles.
Inside Bar Buoy, in 9 fathoms	N. 53	E.	5½ miles.
Seal Rocks, off Point Lobos	N. 63	E.	7¾ miles.
Fort Point and Alcatraz Lights	N. 54½	E.	9¼-12⅝ miles.
Duxbury Reef Buoy, in 12 fathoms	N. 22½	W.	6¾ miles.
Southeast Farallon Light	S. 60	W.	16½ miles.
Noonday Rock, Bell Buoy	S. 79	W.	23½ miles.
Point Reyes Light	N. 68	W.	22½ miles.
Rock off Point San Pedro	S. 51	E.	12 miles.
Point Montara Fog-whistle	S. 42½	E.	15 miles.

Sometimes Table Mountain Peak (Mount Tamalpais), Montara Mountain, and Las Papas can be seen over the fog in approaching the bar, and the bearings and distances of these from the Whistling Buoy are as follows:

Table Mountain, Eastern Peak, 2,594 feet high	N. 7½	E.	11½ miles.
Las Papas, or the Paps, 925 feet high	N. 74	E.	10⅝ miles.
Montara Mountain, 1,610 feet high	S. 53	E.	14½ miles.

Fort Point and Alcatraz Island Light-houses in range.

Inside Bar Buoy.—This buoy lies well inside the bar and half-way towards the "Heads." It is a *first-class nun-buoy* with *black and white perpendicular stripes*, placed in nine and one-half fathoms of water at extreme low tides, over a bottom of fine gravel and broken shells; and it may be passed close-to on either side. It lies two and one-quarter miles inside the inner six-fathom line of the bar towards the South Shoal Buoy, but two and a half miles inside the same line at the Main Ship Channel. It is placed on the line through the Whistling Buoy, Fort Point Light, and Alcatraz Island Light.

From it we have the following bearings and distances to prominent objects:

Point Boneta Light-house	N. 30	E.	2⅝ miles.
Lime Point Fog-whistle	N. 41	E.	5½ miles.
Fort Point Light-house	N. 54	E.	4⅞ miles.
Alcatraz Island Light-house	N. 54	E.	7⅛ miles.
South Shoal Buoy, in 5 fathoms	S. 18	W.	3½ miles.
Whistling Buoy, in 15 fathoms outside the bar	S. 53	W.	5½ miles.
Black Buoy off west end Four-fathom Bank, in 6¼ fathoms	N. 82	W.	3 miles.
Black and Red Buoy off east end Four-fathom Bank, in 6½ fathoms, and marks Boneta Channel	N. 25	E.	2⅝ miles.

The *Mid-channel Buoy* in nineteen fathoms between "the Heads" at the entrance to San Francisco Bay was removed in September, 1884, as not needed for the purposes of navigation. It had been many years in position.

South Shoal Buoy.—Just outside of the four and three-quarters fathom spot on the bar, six miles south-southwest (SSW.) from Point Boneta, a *first-class nun-buoy with red and black horizontal stripes* has been placed in six and a half fathoms of water over sandy bottom.

This shoal patch on the outer edge of the bar has from four and three quarters to five fathoms of water upon it, is half a mile long northwest and southeast, and lies about two hundred and fifty yards inside the buoy. With a heavy swell on the bar, the shoal inside the buoy breaks, and vessels should give it a berth of half a mile on either side. A bell-buoy had been placed here but it was upset and replaced by this one. Vessels should give this buoy a berth of half a mile on either side. Just inside of the buoy the bar breaks whenever there is a heavy swell upon it.

From the South Shoal Buoy we have the following bearings and distances to prominent objects:

Whistling Buoy, outside the bar in 15 fathoms	W. ½°	S.	3 miles.
Inside Bar Buoy in 9½ fathoms	N. 18°	E.	3¼ miles.
Point Boneta Light-house	N. 23½°	E.	5⅞ miles.
Mid-channel position between "the Heads"	N. 33°	E.	5½ miles.
Fort Point Light (Mile Rock on line)	N. 30°	E.	7½ miles.
North Seal Rock, off Point Lobos	N. 45°	E.	5 miles.
Ocean Side House	N. 75°	E.	5 miles.
Main Channel across the Bar	N. 41°	W.	2½ miles.

Buoy on the west end of Four-fathom Bank.—To mark the west end of this bank, a *first-class nun-buoy, painted black and numbered* 1 has been placed in seven fathoms of water at the extreme low tides, over a bottom of fine grey and black sand just outside the bar. To cross the bar in five fathoms, vessels should go to the southeast of this buoy about one-eighth of a mile, and then steer for Fort Point Light, gradually opening Point Boneta Light; but the Main Ship Channel across the bar in thirty-four to thirty five feet is only one and a half miles south by east (S. by E.) from this buoy. To the northeast of this buoy for one mile and three-quarters a depth of not less than four fathoms is found across the Four-fathom Bank.

From this buoy we have the following bearings and distances to prominent objects:

Ballenas Point	N. 56°	W.	7¼ miles.
Duxbury Reef Buoy, in 12 fathoms	N. 61°	W.	4½ miles.
Whistling Buoy, outside the bar in 15½ fathoms	S. 17°	W.	4½ miles.
South Shoal Buoy, in 6½ fathoms	S. 30°	E.	4 miles.
Inside Bar Buoy, in 9½ fathoms	S. 82°	E.	3 miles.
Mid-channel position between "the Heads"	N. 77°	E.	5½ miles.
East end of Four-fathom Bank Buoy (black and red), in 8 fathoms	N. 65°	E.	4½ miles.
Alcatraz Island Light just open south of Point Boneta Light-house, the latter	N. 65°	E.	4½ miles.
Seal Rock, off Point Lobos	East		5½ miles.

At the Buoy, Mount Diablo is directly over the Fog Signal of Point Boneta.

Buoy on the east end of Four-fathom Bank.—This is a *first-class nun-buoy, with black and red horizontal stripes.* It is placed on the easternmost end of the Four-fathom Bank to mark the bank and also the west side of the Boneta Channel. It lies in seven fathoms at extreme low tide, over a bottom of fine gray and black sand. The inner edge of the three and three quarters fathom patch on the Four-fathom Bank is two miles west half north from this buoy. A vessel can carry not less than four fathoms over the bank when the Boneta Light bears anything south of east half north. Vessels bound through the Boneta Channel should particularly note that this buoy lies clear of the eastern extremity of the Four-fathom Bank, but they should adhere closely to the ranges for that channel to avoid the bank.

From this buoy we have the following bearings and distances to prominent objects:

Point Boneta Light-house and Alcatraz Island Light-house just open to the south	N. 65°	E.	1 mile.
Fort Point Light	N. 77°	E.	3 miles.
Mid-channel position between "the Heads"	S. 61°	E.	1¼ mile.
South Seal Rock off Point Lobos	S. 45°	E.	2¾ miles.
Inside Bar Buoy in 9½ fathoms	S. 25°	W.	2¾ miles.
South Shoal Buoy in 6½ fathoms	S. 21°	W.	5⅝ miles.
Whistling Buoy off the bar in 15½ fathoms	S. 44°	W.	7½ miles.
West end Four-fathom Bank Buoy in 7 fathoms	S. 65°	W.	4½ miles.
Duxbury Reef Buoy in 12 fathoms	N. 88°	W.	7½ miles.

This buoy lies on the range of Point Boneta with Alcatraz Island Light just open to the south.

The course from it to the Whistling Buoy outside the bar carries a vessel through the Main Ship Channel across the bar.

The line from it to the Duxbury Reef Buoy passes directly across the shoalest spot of the Four-fathom Bank (in three and three-quarters fathoms).

BUOYS OF THE BONETA CHANNEL.

Within the last year the Boneta Channel has been buoyed so that vessels may now use it even when the fore and back ranges are hidden by fog, mist, or smoke. It sometimes happens in quiet summer weather that the smoke of the city is drifted slowly over the entrance of the Golden Gate, and these buoys are then of great service.

For the description of the channel see page 208, and for directions for passing through it see Sailing Directions for vessels entering by the Boneta Channel.

Boneta Channel Buoy.—This is a *first-class nun-buoy painted black and red horizontal stripes,* and is placed in six and a half fathoms of water over a bottom of fine gray sand. It is at the easternmost end of the Four-fathom Bank and on the west side of the Boneta Channel abreast Point Boneta Light-house. It lies south sixty-five degrees west (S. 65° W.) from Boneta Light-

house, and very nearly half a mile distant. At the buoy, Alcatraz Island Light-house is just open to the south of Point Boneta Light-house. The deepest part of the channel is half way between the buoy and the Light. It is passed on either hand in going out; that is, it is passed on the port hand when a vessel is going through the Boneta Channel, or on the starboard hand when she is passing along under the Four-fathom Bank for the Main Ship Channel. In coming in through the Boneta Channel it is passed on the starboard hand.

From this buoy, Fort Point Light house bears north seventy-seven degrees east (N. 77° E.) distant three miles; Mile Rocks bear south sixty-five degrees east (S. 65° E.) distant one and seven-eighths miles; the inner mid-channel buoy, in nine and a half fathoms, south twenty-five degrees west, distant two and three-eighths miles; the black buoy on the east side of the channel north forty-four degrees west (N. 44° W.) distant seven-eighths of a mile; and the red buoy, at the northwest entrance to the channel, north sixty-five degrees west (N. 65° W.) distant one and three-eighths miles.

Boneta Channel Buoy.—This is a *first-class nun buoy painted black and numbered* 3, and placed in eight and a half fathoms of water over sandy bottom. It is located on the east side of the channel, and nearly one-third of a mile outside the three-fathom curve. It is abreast the valley of the Rodeo Lagoon, which opens upon a low sandy shore about one-quarter of a mile long. In entering the channel from the northwestward, it is passed on the port hand about three hundred yards distant. At this buoy, the outer Seal Rock off Point Lobos and the red and black striped buoy off Point Boneta are in range. From it Point Boneta Light-house bears south sixty-seven degrees east (S. 67° E.) distant one and one-eighth miles; the red and black striped buoy south forty-four degrees east (S. 44° E.) distant seven-eighths of a mile; and the red buoy, at the northwest side of the entrance to the channel south eighty-four degrees west (S. 84° W.) distant one-third of a mile.

Boneta Channel Buoy.—This is a *first-class nun buoy painted red* and placed in seven and a quarter fathoms of water over fine gray and black sand. It marks the extreme north limit of the Four-fathom Bank, and also the west side of the northwest entrance to the Boneta Channel. It is five-eighths of a mile from the nearest point of the rocky shore to the northeastward, and Tennessee Valley opens to the north by east half east. At this buoy Point Boneta Light-house and the cross on Lone Mountain are in range. From it Point Boneta Light-house bears south seventy-seven degrees east (S. 77° E.) distant one and three-quarters miles; the red and black striped buoy off Point Boneta south sixty-five degrees east (S. 65° E.) distant one and two-fifths miles; the black buoy on the east side of the channel north eighty-four degrees east (N. 84° E.) distant one-third of a mile; and the Duxbury Reef Buoy south eighty-seven degrees west (S. 87° W.) distant six and one-quarter miles.

In addition to these regular buoys, marking the various shoals and channels over the bar, buoys are sometimes placed to mark temporary obstructions to navigation; but such buoys are removed when the obstruction no longer exists. In 1887 there was one such buoy on the bar.

San Francisco Bar, wreck buoy.—This (*green*) buoy which marked the wreck of the *Escambia* on the southern part of the bar has been removed, as the wreck has been destroyed. It lay five and a quarter miles south by west half west (S. by W. ½ W.) from Boneta Point Light-house.

GENERAL SAILING DIRECTIONS FOR APPROACHING AND ENTERING SAN FRANCISCO BAY.*

In approaching the coast in the vicinity of San Francisco it is of great importance that accurate determinations of a vessel's position should be obtained, as fogs and thick weather are apt to prevail near the land. Some of the fogs are very dense and dark, and lie close to the surface of the water for days and even weeks; some hang overhead about one or two hundred feet, permitting the low lights and other aids to navigation to be made out.

The immediate approaches to San Francisco Bay are favorable; the landmarks are bold and easily recognized; the buoys, lights, and whistles are nearly sufficient; and the entrances are

*There are belonging to San Francisco four first-class schooner-rigged pilot boats with twenty licensed pilots. Two boats are always cruising outside the bar, one as far as the Farallones, and the other around the bar.

Marine Signal of Distress.—On the 5th of December, 1870, the pilot commissioners of San Francisco, Mare Island, Vallejo, and Benecia adopted the following signal for vessels in distress off the entrance to San Francisco Bay or the harbor, desiring the services of a steam-tug: *Signal*, the national flag of the vessel in distress to be hoisted at the main truck.

to pass through, as there are no obstructions anywhere near the mid-channel. In the foggy weather of summer these advantages disappear, and the stranger can only approach the bar and wait for a pilot. In clear weather, after a vessel has crossed the bar, there are some precautions to be given to a stranger attempting the passage through the Golden Gate. It is utterly impracticable to anchor in the Golden Gate itself, and only two anchorages inside "the Heads" are referred to in the detailed description. The currents are very strong and very irregular around the different points and around the Mile Rocks. The flood sets strong towards all the points on the north shore, and the ebb sets towards Fort Point very strongly and irregularly, with an eddy at times under the west side of the point.

With a good breeze and clear weather, a ship should be guided in her course through the Golden Gate by the land rather than by the compass, especially as the islands, points, and high ground on the east side of the bay afford many opportunities for good ranges.

In light winds, there is danger of being carried too close to either shore, and sometimes large vessels are embayed close under the northern points when the wind is dying out, and are in danger of being carried on the rocks by the strong swirling currents. They may anchor in Boneta Cove on the north, or in Fort Point Bight, east of Mile Rocks, on the south side, but the latter is especially to be avoided; and a large vessel anchoring there should not attempt to get under way without the assistance of a tug.

If a vessel has anchored near the Inside Bar Buoy or towards the mid-channel between the Heads, it will be found that during the summer there is little wind from midnight until ten o'clock in the morning; generally the sea-breeze sets in at this time, but if it is not strong enough to draw through the Golden Gate (which may be readily ascertained from aloft) remain at anchor or take a tug.

At night, vessels under way should not attempt to run in at a late hour, especially if the ebb tide is about to make, because the regular summer sea-breeze dies out between the Heads before midnight. Easterly winds, are very rare. With southeast winds, vessels may cross the bar by the South Channel to windward of the South Shoal Buoy, and even with an ebb-current may fetch the anchorage off Black Point without tacking, because the strong ebb from Raccoon Straits and the upper bay cuts the vessel on the lee bow.

In ordinary weather, summer or winter, vessels may cross the bar anywhere south of the Four-fathom Bank that the wind will permit. With the usual summer winds square-rigged vessels can be handled can barely cross by the South Channel; with the wind well to the westward they can do so. In southeast weather, vessels may cross by the South Channel before it begins to break; when the whole bar is breaking a sailing vessel must cross by the Main Ship Channel or head off shore, but a steamer may enter by the Boneta Channel. In the South Channel, with a heavy swell, steamers would roll badly, but do not pitch so heavily as in the Main Ship Channel. In the Boneta Channel, moreover, there is a depth of from eight and a half to nine fathoms of water, and steamers may enter and leave by it in the heaviest southeast weather. It is now well buoyed; see Directions for entering by it. Nearly all summer the vessels from the northern coast run steamers across the Four-fathom Bank, even when it is breaking. The British sloop of war *Comus* passed out over this bank at a time when the swell was large but not breaking.

A vessel should not anchor upon the bar, because the swell rolling in against the ebb-current makes a short, heavy sea that makes such anchorage very uncomfortable and at times dangerous. Moreover, a westerly ground swell may come up without any warning.

In *foggy weather* it is frequently impossible to see more than a vessel's length, and extreme caution must be exercised in approaching the bar by those unacquainted with the coast, currents, and winds. The safer plan is to try to make the Automatic Whistling Buoy, or "the Bull," lying 9 fathoms off the Main Ship Channel across the bar. From it, cross the bar in five and a half fathoms on a northeast half east (NE. ½ E.) course, which will lead through the middle of the Golden Gate. Soon after crossing the bar, the steam fog-siren on Point Boneta should be heard, and care must be taken not to bring it to bear anything east of northeast (NE.). If the current is strong it will carry a vessel in very nearly on her course to abreast of the Boneta Channel, when the current through that channel would probably set her slightly to the southward. If the current is strong it will be almost directly against her until nearly up to Point Boneta, when the effect of the current must be watched. There is usually a very strong current up for several hundred yards off Point Boneta. If a course is taken from one mile north of the Whistling Buoy, steer northeast by east (NE. by E.) and follow the special instructions elsewhere given.

The lead can not be used after entering between the Heads, but soon after passing Fort Point the water shoals so that it is again available.

The main aid to navigation in the Golden Gate during the fogs is the steam Fog-whistle on the eastern rock close under Lime Point. (See description, page 179.) It can be distinctly heard at the Heads and even for quite a distance outside of them, and also well inside the harbor. Reliance must be especially placed on this whistle, because very frequently the bell on Fort Point can not be heard until a vessel is abreast of it. Nevertheless several steamer captains report that there is a part of the entrance, between Mile Rock and Fort Point, where the Lime Point Fog-whistle is not heard, although they hear it outside, and again hear it when off Fort Point.

The fog driving in through the Golden Gate continues in a nearly straight line or compact mass for some time, so that the south shore inside of Fort Point will be comparatively free from fog, or light up at times until it has finally settled over land and water. Vessels can therefore take advantage of this by passing around Fort Point as closely as practicable. But it must be particularly remembered that the current through the Golden Gate reaches six and six-tenths miles per hour, with heavy current rips and boiling, whirling water. The ebb current around this point is strong and very irregular, and tends to crowd a vessel on the northeast face of the point. If the wind is light after passing through the Golden Gate, and the current flood, it is imperatively necessary to keep over towards the south shore, as this current sets strongly towards Arch and Shag Rocks. A vessel may anchor in ten fathoms under the tail of the Presidio Shoal if she finds it necessary.

Vessels approaching the Bar of San Francisco at night must not be misled by a *bright electric light* placed over Telegraph Hill at an elevation of exactly four hundred feet above the level of the sea, and therefore possibly visible on the horizon at a distance of twenty-three miles; at a short distance it is seen as a light of great brilliancy. It does not show over the whole seaward horizon, on account of intervening hills, but strikes the horizon through several depressions, as follows:

Over the fourth depression of Point Boneta, just north of the old Light-house tower, and is limited by the bearings north eighty-five and a quarter degrees west to north eighty-four and a third degrees west (N. 85¼° W. to N. 84⅓ W.).

Over the second depression of Point Boneta, just south of the old Light-house tower, from north eighty-two and a half degrees west to north eighty-two degrees west (N. 82½ W. to N. W.).

Through part of the Golden Gate, being limited on the north about two hundred and yards north of the Point Boneta Light, on bearing south eighty one and a half degrees west (S. 81½° W.), and on the south by the high ridge rising up from Fort Point, on bearing south seventy four and a half degrees west (S. 74½° W.).

Over the sand dunes three-quarters of a mile south of the Seal Rocks, from south fifty and a quarter degrees west to south forty-seven degrees west (S. 54¼° W. to S. 47° W.).

It is therefore visible between the "Heads," but on the northern side of the mid channel. As there may be circumstances when this light would become a danger to navigation, a special examination has been made upon it from seaward under very favorable atmospheric conditions. A vessel might mistake it for the Boneta Light if the latter were obscured by a patch of fog. In the examination which was made, the electric light was not visible on the bar near the South Buoy; but at one and a half miles outside the bar, in thirteen fathoms of water, it was first raised over the sand dunes, and then only visible by the aid of a glass. On a course due north from Whistling Buoy, it was found on the given bearing through the Golden Gate, with Alcatraz Fort Point, and Point Boneta Lights in sight at the same time. The electric light was less than any of them, and the Boneta Light was quite bright, at a position one mile outside the in thirteen and a half fathoms. When the northern limit of this arc of visibility was reached one and a half miles outside the bar in thirteen fathoms, a course west by south (W. by S. run, and the light was lost at a distance of eighteen miles from it, or eight miles outside the in twenty-five fathoms, so that it is not at all visible on the horizon. It therefore does not so far as the electric lights at Los Angeles.

This light, being a private undertaking not at all connected with the shipping, is liable discontinued at any time. As a fact it was not showing for four nights previous to the examination referred to.

Remarks upon the Coasting Navigators.—In giving general directions to vessels for the proaches to San Francisco, as well as to other ports and anchorages on this coast, it must

tinctly understood that they do not cover the hundreds of varying cases that occur in practice. They are intended to guide navigators who are not fully acquainted with the peculiarities of the coast, the landfalls, soundings, currents, etc., and the climate of the immediate seaboard; and to assist those who are partially acquainted with these conditions and yet refuse to take any risk whatever. While these risks may be considered great, nevertheless those who will not try to make their ports in foggy weather must frequently wait a week, or even weeks, until the fogs clear up sufficiently for the land to be made out with certainty.

Besides the Government officers who have made the surveys along the coast, and the many experienced masters of sailing vessels, there has grown up on this seaboard a body of masters and mates of steamers who have to make their trips from San Francisco to the northern and southern ports in the thickest fogs, and to return on time without probably seeing any object half a mile distant during the voyage. These men have learned the character of their vessels, the errors of the compasses, the set and force of the off-shore and the in-shore currents, the influence of the wind in particular localities, and the direction and strength of the tidal currents. They know the peculiarities of the fog-whistles and of the automatic buoys under all circumstances of wind, weather, and sea. They are familiar with the aspect of every mile of shore-line close to the water's edge, when the higher lands are in fog; every patch and field of kelp; and every rock and break. They have tabulated and memorized every course and the time on each to the fraction of a minute for all the varying conditions of the tide, swell, wind, etc. They are ceaselessly vigilant day and night, and they approach a cape, point, rock, light, or port with confidence, self-reliance, and certainty. We have sailed with them and bear testimony to these many qualifications which command success, and without which time, capital, and human life would be jeopardized and frequently sacrificed.

It is utterly impracticable to formulate the minute knowledge of these navigators; it is of a character wholly distinct and different from that of commanders who have the broadest sea-room and the amplest outfit of men and means. It is even impracticable for themselves to give rules for this seaboard navigation, because every trip and every vessel affords some new phases or conditions of the problem. To aid these captains in this anxious navigation, the steamship companies and the great mill owners show private lights at the different harbor wharves when a vessel is expected; or give other warning to aid them in reaching their berth or anchorage. These, however, may be changed at any time, and therefore they are not mentioned as guides to the strangers.

While we endeavor to give full and clear directions for the navigation of the coast, yet the above remarks should be borne in mind as indicating the need of a special training and aptitude on a bold rocky coast so frequently enveloped in dense fog.

SAILING DIRECTIONS WHEN COMING FROM THE SOUTHWARD.

When coming from the southward it is customary for steamers to make the coast about Point Año Nuevo (steam fog-whistle), in latitude 37° 06¼′, or Pigeon Point (Light-house and steam fog-whistle), five miles further north, and then follow it to the bar, keeping about three or four miles from shore in from thirty to forty fathoms of water. Those acquainted with the coast-line gradually approach it and pass Montara Point (steam fog-whistle) at a distance of two and a half miles where there is a depth of twenty-two or twenty-three fathoms. When Montara Point bears east by north (E. by N.) distant two and a half miles, Point Boneta Light bears north three-quarters west (N. ¾ W.), distant sixteen and a half miles, and in clear weather the light should be distinctly seen and a course laid for it. This will pass Point San Pedro Rock, which is three and a half miles to the northward of Montara, at a distance of two miles in sixteen to seventeen fathoms, and the water will shoal very gradually to the bar, which on that course can be crossed in five and three-quarters fathoms least water. Keep on this course (N. ¾ W.) and the bearing of Point Boneta Light until you open Alcatraz Island Light just north of Fort Point Light, when the mid-channel position between the Heads will be half a mile to the northeast three-quarters east (NE. ¾ E.). This is the position of the old Mid-channel Buoy. Thence the course to the middle of the Golden Gate, but approaching slightly nearer Lime Point, for two and seven-eighths miles is northeast by north (NE. by N.). In one and one-third miles from this mid-channel position between the Heads the north point of Yerba Buena Island opens by Fort Point; and in one and a half miles Yerba Buena Light, on the south end of the island, opens by Fort Point. At the same time Alcatraz Light will be opened one and a half points to the northward of this last range

and will bear northeast by east one-quarter east (NE. by E. ¼ E. or N. 59° E.). This will serve as a check on the course the vessel is making in the strong currents generally encountered here. Continue your course until in mid-channel between Fort Point, bearing southeast by south (SE. by S.), and Lime Point, bearing north one-quarter west (N. ¼ W.), when Bluff Point, at the northeast entrance to Raccoon Strait, will be just opened south of Point Cavallos, and Alcatraz Light will bear northeast by east three-quarters east (NE. by E. ¾ E.). Unless you are familiar with the ten-fathom passage between Fort Point and the western tail of the Presidio Shoal do not approach Fort Point, but change your course to cross the Presidio Shoal in the best water on the back range of the extremity of Point Diablo on with the old tower of Point Boneta; or, if the fog has hidden Point Boneta, then steer east by north one-quarter north (E. by N. ¼ N. or N. 76° E.) for the north point of Yerba Buena Island and pointing midway between Black Point and Alcatraz Island. Run on this course until Alcatraz bears north, then haul up towards the city front. Or, if dark when abreast of Fort Point, steer half a point to the northward of Yerba Buena Light. This course passes one quarter of a mile to the northward of the Presidio Shoal Buoy, which lies in three and a half fathoms of water; and over the Presidio Shoal is not less than five and a half fathoms.

Or, after a vessel has passed Fort Point, she may haul up sharp under the south shore about half a mile east-northeast (ENE.) from Fort Point until Point Boneta is open two-thirds of a point north of Fort Point; pass along the south side of the tail of the Presidio Shoal in nine or ten fathoms on an east by north three-quarters north (E. by N. ¾ N.) course, which is the line Fort Point and north point of Yerba Buena Island, securing a range on the Contra Costa hills. This course is in nine to twelve fathoms of water, and passes nearly midway between the Presidio Shoal Buoy and the Anita Rock Spindle. Continue to the anchorage off Black Point in from six to nine fathoms over coarse sand and broken shells. This track has one great advantage; in foggy weather the south shore is clear longer than any other.

At night, when coming from the southward, bring Point Boneta Light to bear north three-quarters west (N. ¾ W.) and steer for it until Alcatraz Light is opened just north of Fort Point Light; then change the course to northeast one-quarter north (NE. ¼ N.) for two and seven-eighths miles to the middle of the Golden Gate between Lime Point and Fort Point. When two miles on this course, and just south of Point Diablo, the Yerba Buena Light will be opened to the northward of Fort Point Light. At the end of the two and seven-eighths miles, Fort Point Light will bear southeast by south (SE. by S.) a little over half a mile distant; Alcatraz Light east-northeast nearly (N. 66° E.) two and five-sixths miles distant; Yerba Buena Light east three-quarters north (E. ¾ N. or N. 80° E.) five and two-thirds miles distant; and Point Boneta Light west southwest (WSW. or S. 67° W.) two and one-third miles distant; Lime Point will bear north a little over one-third of a mile distant. At this point change the course to east by north one-quarter north (E. by N. ¼ N.) nearly for Yerba Buena Light, with Alcatraz Light open one and one-third points to the northward. Do not go to the southward of that bearing, and cross the Presidio Shoal in five and a half fathoms. Anchor off Black Point in seven to ten fathoms, soft bottom, with Alcatraz Light bears north.

If the weather is thick or foggy, steamers make Point Año Nuevo Fog-whistle, and when abreast of it, lay a course northwest three-quarters west (NW. ¾ W.) for twenty-three miles, which brings them three miles square off Montara Point in twenty-four or twenty-five fathoms over black sand (steam Fog-whistle at Montara). From this position the Whistling Buoy off the bar in twenty fathoms will bear north thirty-two degrees west (N. 32° W.) distant fourteen miles; Point Bonita Light and Steam Fog siren north eight degrees west (N. 8° W.) seventeen miles; and the southern edge of the bar at the South Channel on the same bearing distant eleven and a half miles. If the weather is very thick, do not approach the shore in less than ten fathoms, but when in ten fathoms on the outer edge of the bar wait until the Fog-siren on Point Boneta is heard, get its bearing, and cross the bar with the lead going; or, for safety, head to westward in not less than ten fathoms and anchor. If the master has a knowledge of the currents and the peculiarities of shore objects as seen in a fog when it lifts at times, he may run for the Boneta Fog-siren bearing north-northwest (N. ½ W.), crossing the bar in not less than five and three-quarters fathoms, until the water deepens to fifteen fathoms. This will place a vessel five-eighths of a mile southwest three-quarters west (SW. ¾ W.) from the mid-channel position between the Heads, where there is nineteen fathoms. If in doubt, anchor at once; if satisfied with your local knowledge of the force and direction of currents, etc., steer northeast one-eighth north (NE. ⅛ N.) for three and one-third miles to the middle of the Golden Gate. But any doubt or hesitation will lead to danger and perhaps loss, as it may

coast of the *Costa Rica*. Thence the course is north seventy-six degrees east (N. 76° E. or E. by N. ¼ N.), crossing the Presidio Shoal ridge in not less than five and a half fathoms.

In the thick summer fogs the smaller coasting steamers from the lower coast ports sometimes follow the beach north of Point San Pedro within a mile to catch glimpses of the land, and round the Seal Rocks and Point Lobos at half that distance, sometimes judging of their proximity to the latter by the roaring of the sea-lions on the Seal Rocks. If the ebb-current is very strong, they pass inside the Mile Rocks and follow the shore towards Fort Point, taking advantage of the eddy current elsewhere referred to, and try to catch the sound of the fog-bell. When the summer fogs are unusually heavy and prolonged, vessels must take these chances or lie outside for days, and possibly weeks.

But since the placing of the steam fog-whistle on Lime Point, it is safer to run for the Boneta Fog siren on the north half west or north three-quarters west (N. ½ W. or N. ¾ W.) course until a depth of twenty fathoms is obtained, when Point Boneta should be nearly seven-eighths of a mile distant; change the course to northeast one-third east (NE. ⅓ E.) for two and two-thirds miles to the middle of the Golden Gate, when Lime Point will be one-third of a mile north. But the whistle on Lime Point will be heard when abreast of Point Boneta, and if the vessel gets too close to the shore between Point Boneta and Point Diablo, the sound of the Lime Point whistle will be cut off by Point Diablo, and she must haul out and run by the bearing of the whistle. The force of the currents must be allowed for as carefully as practicable.

SAILING DIRECTIONS WHEN COMING FROM THE WESTWARD.

Coming from the westward in the parallel of the Southeast Farallon, vessels in very clear weather first make Mount Tamalpais (the highest peak of the coast range to the northward of the Golden Gate, formerly called Table Mountain), when thirty-five miles outside the Farallones; then at eighteen miles outside are raised in succession Mount Helena, Mount Diablo, Montara Mountain, Point Reyes Head, San Bruno Mountain, The Paps, etc. *The Southeast Farallon* is made as a high conical islet with the Light-house on the summit. There are several lower summits on the island, making it appear as a cluster of islets. In good weather vessels may pass it to the northward or southward in twenty fathoms; but in passing to the northward of it avoid approaching the Middle Farallon, a very small rocky islet, because there lies off it a rock having five and one-quarter fathoms upon it, with thirteen fathoms around it. This sunken rock lies south twenty-five degrees west (S. 25° W.) two-fifths of a mile from the Middle Farallon, and north sixty-seven degrees west (N. 67° W.) two and three tenths miles from the Light-house on the Southeast Farallon. With a very large swell it breaks at intervals on this rock. A vessel may safely pass between the Middle and Southeast Farallones in thirty-six fathoms of water. But it is preferable and advisable to pass to the southward of the Southeast Farallon, especially in light airs, in thick weather, or at night. Do not, however, approach this islet within a mile, because a six-fathom rock has been discovered lying five-eighths of a mile southeast from the Light, upon which heavy swells break. When the Middle Farallon can be seen clear on either side of the Southeast Farallon a vessel is clear of this danger. From the Southeast Farallon Light the course to the Whistling Buoy outside San Francisco bar in fifteen fathoms, is north sixty degrees east (N. 60° E. or N. by E. ½ E.) and the distance sixteen and a half miles, with regular bottom of gray sand shoaling from thirty to fifteen fathoms.

The *Whistling Buoy*, elsewhere described, lies on the range of Fort Point and Alcatraz Island lights, and, under ordinary conditions of refraction, the latter shows the higher. From the Whistling Buoy the course across the bar in not less than five and a half fathoms to the mid-channel position between the Heads, is northeast three-quarters east (NE. ¾ E.) and the distance seven and three-quarters miles. This course passes the Inside-Bar Buoy in five and one-eighth miles from the Whistling Buoy. But the best water across the bar is by the *Main Ship Channel*, leaving the Whistling Buoy one mile to the southward and crossing the bar in five and three-quarters fathoms east by east one-quarter east (NE. by E. ¼ E.) course, and passing the Inside-Bar Buoy one-quarter of a mile on the starboard hand. Continue on the course by ranges until Point Boneta Light bears north three-quarters west (N. ¾ W.) with Alcatraz and Fort Point Lights in range or so open that Alcatraz Light be hidden behind Fort Point. From this point steer northeast by north (NE. ¼ N.) which will carry a vessel through the Golden Gate nearly midway between Fort Point and Lime Point. If the currents tend to force a vessel off her course she may,

in day-time and clear weather, readily maintain it by keeping her ranges, of which the islands, points, and Contra Costa hills on the further side of the bay give any number. Keep clear of the foul ground off Fort Point, and when the Light on it bears southeast by south (SE. by S.) and Alcatraz Light bears east northeast nearly (ENE. or N. 66° E.), change the course to the north point of Yerba Buena Island bearing north seventy-six degrees east (N. 76° E. or E. by N. ¼ N. and pointing midway between Black Point and Alcatraz Island; or, if dark, steer directly for, or half a point to the northward of, Yerba Buena Light. This course passes over deep water one-quarter of a mile to the northward of the Presidio Shoal Buoy, which lies in three and a half fathoms, and over the Presidio Shoal in not less than five and a half fathoms.

Or, after a vessel has passed Fort Point, she may (as already directed under the head of Sailing Directions when coming from the southward) haul up under the south shore about half a mile east-northeast from Fort Point until Point Boneta is open two-thirds of a point north of Fort Point; pass along the south side of the tail of the Presidio Shoal in nine or ten fathoms of water on an east by north three-quarters north (E. by N. ¾ N.) course (which is the line of Fort Point and north point of Yerba Buena Island), securing a range on the Contra Costa hills. This course is in nine to twelve fathoms of water, and passes nearly midway between the Presidio Shoal Buoy and the Anita Rock Spindle. Continue to the anchorage off Black Point in from six to nine fathoms, soft bottom, or off the north face of the sea-wall at North Point in eight to nine fathoms over coarse sand and broken shells.

If the weather is bad, but the bar is not breaking too heavily, it may be crossed by the Main Ship Channel by taking two or three breakers. We have crossed it several times when it was breaking; in one case a very large hawser was towed astern to prevent the steamer from broaching to and was completely effective.

SAILING DIRECTIONS WHEN COMING FROM THE NORTHWESTWARD.

Coming from the northwestward, vessels first make Point Reyes Head and Light in latitude 38° 00′, longitude 123° 01′, and pass it at a distance of from one to three miles in twenty to thirty-five fathoms of water, or even further out. If the northwest wind is light, a sailing vessel may lose much of it by passing the point nearer than two miles. The swell decreases after passing the point; and this is a very marked feature that may be taken advantage of in thick weather. At the season of freshets in the Sacramento River the water under Point Reyes may be much discolored with the yellow material in suspension, and this discoloration sometimes extends to the northward of Point Reyes.

From Point Reyes Head the Whistling Buoy off the bar bears south seventy-three degrees east (S. 73° E.) twenty-two miles distant; Duxbury Reef Buoy, in twelve fathoms, south seventy-nine degrees east (S. 79° E.) eighteen miles distant; Southeast Farallon Light house, south two degrees east (S. 2° E.) seventeen and a half miles; and Noonday Rock south by west (S. by W.) fourteen miles. If the weather is fair a vessel need not run for the Whistling Buoy, but keep a course just outside Duxbury Reef Buoy and cross the Four-fathom Bank near the buoy on its western end in four and three-quarters fathoms; and thence run a course to the mid channel position between the Heads and through the Golden Gate, as detailed under the head of Sailing Directions when coming from the southward and from the westward. When up with the Duxbury Reef Buoy the mountains south of the Golden Gate will give good ranges for the keeping of a course if the weather is clear.

If the bar is heavy it is not advisable to cross it near the buoy on the west end of the Four-fathom Bank. When abreast of this buoy, and outside the bar, run to the southward in the direction of the Whistling Buoy. Alcatraz Island will be just opened out to the southward of Point Boneta when a vessel has run about one quarter of a mile on this course; continue on until Alcatraz Island is seen squarely in the middle of the Golden Gate, between Fort Point and Mount Diablo (Lime Point being still closed in behind the latter), when the Whistling Buoy will bear between south and south southwest, according to the distance from the bar, about two miles distant. At this point change the course for Point Lobos, bearing east by north one quarter north (E. by N. ¼ N.), and the deepest water in the Main Ship Channel across the bar will be on that bearing. Keep on this course until the water deepens to eight and a quarter fathoms about two miles inside the bar, or until the south point of Alcatraz Island comes in range with Fort Point; then change your course to that range, north fifty-four degrees east (N. 54° E., or NE. ¾ E.), and run for the mid-channel position between the Heads.

Or when inside the bar in seven fathoms lay a course direct for Alcatraz Island Light bearing north fifty-eight degrees east (N. 58° E. or NE. by E. ½ E.), and run until Point Boneta Light bears north sixty five degrees west (N. 65° W. or NW. by W. ¾ W.). Then steer through the middle of the Golden Gate for Point Blunt, the southeast head of Angel Island, bearing northeast half north NE. ½ N). Continue as described under the head of Directions when coming from the southward and from the westward.

If the weather is very thick and Point Reyes has been made by the fog whistle, shape a course for the Whistling Buoy (or the "Bull") off the bar. The only danger on this course is that the current may set a vessel in towards Duxbury Reef; to guard against this contingency keep the lead going and do not run into less than twenty fathoms of water until within four miles of the Whistling Buoy, when it shoals up very gradually to fifteen fathoms at the buoy. When the buoy is made, cross the bar with the sound of the whistle bearing southwest (SW.); and when across, and the water deepens to seven fathoms, steer a northeast by east (NE. by E.) course until you hear the Point Boneta Fog-siren. A stranger should not attempt to do any more than cross the bar and run into ten fathoms and anchor. Sometimes the fog does not lie on the water, but objects one hundred to one hundred and fifty feet high can be seen under it. In such a case Point Boneta and the Light-house may be visible, and a vessel may enter on the usual course after Point Boneta bears north three-quarters west (N. ¾ W.) and the vessel is in mid-channel between Point Lobos and Point Boneta.

SAILING DIRECTIONS FOR VESSELS ENTERING BY THE BONETA CHANNEL.

If the bar is breaking too heavily to be risked, the only entrance is by the Boneta Channel with clear weather; but even here, when in the narrowest part, the vessel's course is for a short time broadside to the large, short swell that has passed over the Four-fathom Bank. It would be dangerous for a sailing vessel to attempt it with light winds; but close under the high cliffs for five miles northwest of Point Boneta there is anchorage in northwest winds in eight to ten fathoms, over an even bottom of fine sand, shells, and in some places mud. We have, however, passed through the Boneta Channel in a sailing vessel, with a moderate westerly wind, from an anchorage dangerously close under the cliffs near Frank's Valley (1854).

A vessel from the northwest, bound through the Boneta Channel, should make the Duxbury Reef Buoy, lying in twelve fathoms one and one-fifth miles southeast (SE.) from the westernmost part of the reef, and then steer east by north (E. by N.) for the high mountain one and two-thirds miles north of Boneta, with Point Boneta bearing one point to the southward of that course. Get a range of the rocky shore ahead with the high land behind it and keep it on. This course, east by north (E. by N.), will carry a vessel over an almost level bottom of twelve, eleven, ten, and nine fathoms with fine gray sand near the bank and shore. Continue the course until Lone Mountain cross is shut in behind Point Boneta and the wind-mill on the northeast side of Point Lobos comes in range with Blue Mountain, the first high peak west of Lone Mountain. (See view appended.) When this range is reached the vessel is in nine fathoms of water, with nine and a quarter fathoms inside her position; change the course and run in on that range without fail. Point Boneta will be distant two miles and open half a point to the eastward. This range bears south sixty-three and one-half degrees east (S. 63½° E. or SE. by E. ⅝ E.), and will carry a vessel through the deepest water of the Boneta Channel and clear of all dangers.

If the range of the hills is hidden by mist, fog, or smoke, the Red Buoy, which has recently been placed to mark the extreme northern limit of the Four fathom Bank as well as the northwest side of the entrance to the Boneta Channel, may be used. It lies six and a quarter miles north eighty-seven degrees east (N. 87° E.) from the Duxbury Reef Buoy, that is, in twelve fathoms. This buoy, described on pages 192 and 205, is placed in seven and a quarter fathoms of water at a distance of five-eighths of a mile from the nearest shore; and a vessel may run from the Duxbury Reef Buoy on a course east half north (E. ½ N.) for six miles in not less than eight and three quarters fathoms of water, until this red buoy bears southeast distant nearly half a mile. Passing this buoy on the starboard hand at a distance of three hundred yards, the course through the channel is south sixty-five degrees east (S. 65° E.) for one and three-quarters miles. This passes the black buoy on the shore side of the channel at a distance of three hundred yards on the port hand at three-fifths of a mile from the red buoy, and passes the red and black striped buoy on the eastern end of the Four-fathom Bank at a distance of three hundred yards on the starboard hand at seven-eighths of a mile from the black buoy; and it clears the rocks under Point Boneta Light-house nearly three hundred yards, and three-eighths of a mile from the red and black striped buoy.

If the current be flood through the channel, there will doubtless be a tendency to set a vessel very slightly towards the shore, and the heavy swell will certainly heave a vessel towards the shore; if the current be ebb through the channel, there will be some tendency to set a vessel towards the eastern end of the Four-fathom Bank, with the swell heaving her inshore, so that the range must be closely followed until the vessel is past Point Boneta, and continued to mid-channel when she will be inside the Heads and may shape her course as elsewhere directed. Or after passing Point Boneta continue on the range until Fort Point and the north point of Yerba Buena Island are in range and bearing east by north three-quarters north (E. by N. ¾ N.). Change the course to this latter range and run until the southeast point of Angel Island (Point Blunt) bears northeast half north (NE. ½ N.); steer for it until the old tower on Point Boneta is on with the extremity of Point Diablo, and then follow previous directions.

If the forward range for the Boneta Channel (the wind mill on the northeast side of Point Lobos on with Blue Mountain) can not be distinctly made out, the back range for the same channel may be used instead; it is generally more distinct than the forward range. This back range is Rocky Point on with the apparent highest summit of the Point Reyes Ridge. (See accompanying view.) Rocky Point lies six miles west-northwest (W. NW.) from Point Boneta Light.

In northwesterly weather the approaches to the Boneta Channel are smooth even if the Four-fathom Bank is breaking heavily.

It is asserted that the current in the Boneta Channel runs flood when the current past Point Boneta is ebb. One examination verified this as to the surface current.

Approaching the Bar in Heavy Southeast Weather.—In approaching the bar from the *southward* and *westward* in heavy southeast weather when it is unsafe to cross it on account of its breakings, vessels are generally able to make out the lay of the land even through the rain or thick misty atmosphere. Coming from the south they can pass half a mile inside the Whistling Buoy, and thence steer a course due north in twelve and eleven fathoms of water for three and a quarter miles; or until the black buoy just off the west end of the Four-fathom Bank is in line with Point Boneta Light-house and Alcatraz Island Light-house and bearing north sixty-five degrees east (N. 65° E.), distant five-eighths of a mile. Mount Tamalpais (or Table Mountain) is usually covered with clouds in rainy weather, but if it should be visible when you are inside the Whistling Buoy, steer for the eastern peak for about five miles, hauling gradually to the eastward in ten fathoms of water with the breaking bar on the starboard beam as a good guide. After passing the western Four-fathom Bank Buoy, and being in eleven or twelve fathoms of water, steer northeast by east half east (NE. by E. ½ E.) for two and seven-eighths miles in ten to nine fathoms of water until the high hill one and two-thirds miles north of Boneta bears east by north three-quarters north (E. by N. ¾ N.), and then steer for it one and three-eighths miles in nine fathoms under the breaking bar until the wind-mill on the northeast side of Point Lobos is on with Blue Mountain, or Rocky Point is on with the highest summit of Point Reyes Ridge. (See views of locality.) This places a vessel five-eighths of a mile from the cliffs in eight and three-quarters fathoms of water, with Point Boneta distant about two and a half miles and bearing south sixty-eight degrees east (S. 68° E.). If the above ranges are not visible, gradually haul under the north side of the breakers on the Four fathom Bank until the Red Buoy marking the northwest part of the entrance to the channel is made out, and continue through the channel on a course south sixty five degrees east (S. 65° E.), or as elsewhere directed. After passing Point Boneta run southeast by east half east (SE. by E. ½ E.) to mid-channel and then make the usual course through the Golden Gate. Or when Fort Point and the north point of Yerba Buena Island are in range, run in on that range until Point Diablo bears northwest by north three quarters north (NW. by N. ¾ N.); then steer northeast half east (NE. ½ E.) for the southeast point of Angel Island to mid-channel between Lime Point and Fort Point as heretofore directed.

Off Point Boneta there will frequently be found a heavy current rip as if a reef made out from the point, but no known danger extends more than two hundred yards from the Light house; and the current rip need only be watched for its action on the vessel's course.

GENERAL DIRECTIONS FOR VESSELS APPROACHING SAN FRANCISCO IN THICK, FOGGY WEATHER.

Vessels coming from the northwestward are generally coasters who are moderately sure of their reckoning even in thick weather, especially the steamers. They are commanded by men familiar with the coast, and apt to take advantage of the slightest lift in the fog. They endeavor to make Point Reyes fog-whistle and then proceed as elsewhere directed. Steamers coming from

the southward endeavor to make the fog-whistles at Point Año Nuevo, Pigeon Point, or Montara Point, and then run for the San Francisco Bar as previously detailed. Sailing vessels from the southward, beating up the coast in foggy summer weather, generally work as close under the shore as safety permits, and once having obtained the distance of the coast-line by sounding, by a lift in the fog, or by a sight of a mountain over the fog, they make their tacks as short as possible to avoid the heavier swell outside. They are generally laden with produce, of which they carry a great part on deck, and are therefore compelled to follow the coast closely in order to be near shelter from the heavier northwest winds and swell. From the west and southwest it is the usual practice to approach the coast with the Southeast Farallon bearing northeast, because the prevailing summer coast wind is from the west-northwest and northwest, and vessels may therefore expect to have a leading wind to the San Francisco Bar. It is this wind which brings in the heavy fogs. In the winter season, when "southeasters" prevail, a northeast course can also be made for the Southeast Farallon because this wind is generally well to the south, or blows nearly parallel with the coast-line. Moreover, the thick weather of a southeaster does not shut down so completely as the fogs, and the loom of the land can generally be made out some miles distant.

Winds from the northwest round by north and east to southeast are very rare, except the "norther," but all of them bring clear weather.

On account of the densely thick weather experienced along the coast during the foggy season, and for two or three hundred miles off shore, it is difficult, especially for sailing vessels, to determine their position; yet with great care in working up their dead reckoning the latitude ought to be within ten or fifteen miles on either side of their supposed latitude. The longitude may be out much more, and therefore it is a matter of the greatest importance that ship-masters, when approaching San Francisco in foggy weather, should do so with the greatest caution, carefully taking frequent soundings with not less than two hundred fathoms of line, because the depth of water decreases very rapidly from the deep sea plateau to the one-hundred-fathom line. The one-thousand fathom line is only twenty-one miles west southwest (WSW.) from the Southeast Farallon. The line of one hundred and fifty fathoms is distant only four miles from the North Farallones; nearly five miles from the Southeast Farallon; twenty-four miles from Point San Pedro; eighteen and a half miles from Pigeon Point; seventeen miles from Point Año Nuevo; and probably thirty miles west-northwest from Point Reyes.

The necessity for sounding can not be too strongly insisted upon on this coast in foggy weather, even by those familiar with the coast line. The numerous wrecks on the wreck-chart of the approaches to San Francisco testify to the greatest negligence in this matter, and our personal knowledge confirms it. We may refer to the *Lammermoor*, wrecked on Bodega Reef in June, 1887, after sailing for thirty miles over less than one hundred fathoms of water; and the *Fiona*, wrecked some months earlier on the north side of the Southeast Farallon after having backed a ship some distance inside and stood off shore, presumably without heaving the lead. The San Francisco Board of Underwriters has called attention to the urgent necessity for the practice as a great aid to navigation. The reason for the aversion to the use of the lead is no doubt the fact that some time is lost in heaving the vessel aback to obtain a cast. This loss of time may be largely reduced if ship-masters would adopt the means that have been used in Coast Survey vessels for many years. Instead of the heavy deep-sea lead-line and the forty-pound lead with which coasting vessels are generally furnished, we use a line of the size of a cod line, and even smaller, and a lead weighing from fifteen to twenty pounds. A line of such small size that will stand a steady strain of from two hundred to two hundred and fifty pounds may be readily obtained, and five hundred fathoms of it, marked at every ten fathoms beyond the first fifty, which is close enough to be kept on an ordinary log reel. In a five-knot breeze (and when the fogs prevail the wind is generally moderate) a ship may be hove aback, one hundred fathoms or more of line let go, the vessel filled away again on her course within less than twenty minutes, if furnished with such a line; in less than fifty fathoms of water a vessel's headway may be checked sufficiently by merely shaking her up in the wind if she be running with the wind abeam, which is generally the case in approaching the Farallones.

If a sailing vessel, in approaching the coast in thick weather and expecting to make the Southeast Farallon on a northeast course, finds herself in one hundred fathoms water, she is close on the outer edge of the great plateau of the Gulf of the Farallones; and she is either directly ap-

proaching these islands, or is south of them, or is on the western edge of the Cordell Bank. In any case the utmost caution, vigilance, and promptness are to be exercised.

If she finds herself in fifty fathoms of water and does not hear the Fog-whistle on the Southeast Farallon, it is prudent to head off shore on a southwest course and wait for a pilot.

It is hazardous to run into less than forty five fathoms because she may be within one mile to the westward of the Noonday Rock, or she may be two miles to the northward of it. She may be within two miles of the North or Middle Farallones. If twenty miles north of the presumed latitude she will be off the Cordell Bank.

If she finds forty fathoms of water her position might be inside the Noonday Rock, or even inside the North Farallones and in attempting to stand out over her former track she might encounter these dangers.

A very marked characteristic of the approaches to soundings on the gulf plateau should be borne in mind, namely, that for about five miles along the western edge of the Cordell Bank, and for about fifteen miles parallel to the line of the Farallones (from the southeast island to Noonday Rock), the water shoals from one hundred fathoms to fifty fathoms within three miles on a northeast course. In any other part of the approaches the decrease of depth is much more gradual; and between the Cordell Bank and the Noonday Rock the depth even increases after passing over the fifty-fathom connecting ridge.

It is very difficult to lay down any specified rules to work by; nevertheless several hints may be fairly presented.

If a sailing vessel is in one hundred fathoms and is on a northeast course she may continue on that course for two miles, and no more, before the next sounding. Should this sounding be fifty fathoms or less she is either on the western edge of the Cordell Bank or near the North Farallones. There is no danger on the Cordell Bank, but there are outlying rocks off the North Farallones, and no aid to navigation useful in thick, foggy weather exists in that locality. Therefore she should stand off shore on a south southwest course to the one-hundred fathom line, then stand in again on a northeast course and continue this trial process. Now, if on any of these northeast courses she should find a depth greater than fifty fathoms at a distance of two miles from the one-hundred-fathom line, she may continue one mile further on the northeast course (that is, three miles from the one-hundred-fathom line) and again get a cast. If this sounding is forty fathoms or less, the vessel is on the northwestern part of Cordell Bank or very near the Noonday Rock. In this doubt the vessel must haul out again to one hundred fathoms on a south-southwest course, and again stand in as before. But if the sounding at three miles from the one-hundred fathom line (on the northeast course) was fifty fathoms or more, then the vessel is either between the southern tail of the Cordell Bank and Noonday Rock, or she is south of the Southeast Farallon, and should hear the Fog-whistle. In either case continue one mile further northeast (four miles from the one-hundred fathom line) and get another sounding. If now the depth is greater than fifty fathoms, but less than at the three-mile sounding, the vessel is about five miles or more southeast from the Southeast Farallon; if this sounding is from forty to forty-five fathoms the vessel is near the northwestern part of Noonday Rock Shoal, and by continuing on her course will deepen her water to forty-six fathoms in five miles.

If, however, a vessel is inside of the one-hundred fathom line and gets depths of sixty fathoms, and then five or ten miles of fifty-seven fathom soundings, she is heading straight for Point Reyes. A little northwest of this line a vessel would decrease her soundings from one hundred to fifty-five fathoms in two miles, increase them to seventy fathoms in three miles more, and then decrease very regularly to fifty fathoms in the following eight or nine miles.

But for a steamer approaching the plateau of the Gulf of the Farallones it is not necessary to make such off and on approaches.

If she runs into forty-five fathoms and does not hear the Fog-whistle on the Southeast Farallon, she may carefully follow the line of forty-five fathoms; if she is outside the Noonday Rock and the Farallones the general course of this line will be southeast by east half east (SE. by E. ½ E.) and will carry her clear of the islets; and then following the same line of soundings when it trends to the eastward she will finally round the Southeast Farallon on an east course at a distance of two and a half miles from the Light and Steam Fog-whistle, which latter she should hear. This change of direction of the forty-five fathom line is an indication of a vessel's position, and in five miles after the change of course the water shoals regularly. Nowhere else in this neighborhood does this peculiarity exhibit itself. A vessel coming upon the coast in the latitude of Point Reyes would

cross the Cordell Bank and might mistake it for the roughly similar ground around the Noonday Rock; but if she runs on a southeast course in forty-five fathoms on the outer edge of the Cordell Bank, and follows this depth to the eastward when around the southern tail of the Bank, she will very soon deepen her water to fifty-five fathoms, etc., and this would locate her with regard to the Bank. (See description of Cordell Bank.)

Steam-vessels from the northern coast are out only three or four days from their port of departure, and can run down their latitude within reasonable limits to make Point Reyes Steam Fog-whistle; although we were recently upon a steam-ship that had been in fog from Cape Flattery, and when she expected to find Point Reyes on an easterly course, she found herself six miles south of the Southeast Farallon when the fog suddenly broke away. Sailing vessels from the northern coast are sometimes two and even three weeks without observations on account of the density of the fogs. Occasionally a vessel could get the sun's altitude at noon, as the fog lightens overhead for a short time, if the commander had a sextant with a proper artificial horizon attached. But without observations, reliance is placed solely on dead reckoning, and when approaching Point Reyes the lead should be hove frequently for position. Little time is lost because under such atmospheric conditions the wind is usually moderate. Sometimes vessels are guided by falling upon the Cordell Bank if they can make sure of it from the character of the bottom and the depth of water. If a vessel is in fifty fathoms and finds the depth shoaling on a south or southeast course, she must be north of the Noonday Rock Shoal, or even north of the Cordell Bank. In either case there is no artificial aid to navigation except the Noonday Rock Buoy. She must either head off shore, wait for a pilot, or follow the fifty-fathom line until it takes a southeasterly direction with deeper water to the southward.

A vessel coming down the coast and following the forty-fathom line would make a general course of about south by east (S. by E.) from latitude 38° 20′, three miles off Bodega Head, and she would necessarily pass between Point Reyes and the North Farallones at a distance of three and a half miles from the former, when the Steam Fog-whistle should be heard, and the direction of the line of forty fathoms change to southeast by east (SE. by E.). If the Fog-whistle is not heard this change of course should be followed nine or ten miles, when another change to south southwest (S. by W.) takes place. But the bottom is here so uniform that a vessel may well be in doubt as to the exact location; the uniformity of depth is, however, an evidence of her being inside of the Farallones. If the soundings are satisfactory, a vessel may lay a course east half south (E. ½ S.) for fifteen miles to the Whistling Buoy off the bar in fifteen fathoms.

Or if a vessel is coming from the north and keeps on the line of thirty fathoms, she cannot approach the land any nearer than one and a half miles off Bodega Head, when her course will be southeast, changing gradually to south half west (S. ½ W.), which will indicate her position northward of Point Reyes. Off this point the thirty fathom line is two and three-quarters miles distant to the westward, and in moderate weather the Steam Fog-whistle should be heard; but if it is not heard the line of thirty fathoms should be followed and will be found to change quickly to east-southeast (ESE.) for three miles, and then as high as east-northeast (ENE.) for three miles more, bringing a vessel under the eastern point of Point Reyes Head, with a notable lessening of wind and smoother sea. Thence the thirty fathom line may be followed on a general southeast course for nine miles, when the water gradually shoals and a course east by south (E. by S.) for seven miles, with water regularly decreasing to fifteen fathoms, will lead to the Whistling Buoy. If the Whistling Buoy is not heard a vessel should anchor; she may be too near Duxbury Reef or the Four-fathom Bank.

During the rainy season (October to April) and the spring freshets in the Sacramento River and tributaries, the discolored waters of the bay, carried by the ebb-current outside the bar, will sometimes indicate proximity to the approaches; but this must not be wholly relied upon, as we have seen discolored water from the bay, marked by stronger lines of successive ebb tides, working to the northward of Point Reyes. But this discolored water will not be found that far to the southward, as the eddy coast current moves up the coast-line. This discolored water does not reach to the bottom when off in twenty to thirty fathoms, and may overrun shoaler depths. At times the waters of the ebb tide are somewhat discolored beyond the bar.

Echoes of Vessel's fog whistle.—When off Point Reyes some twenty miles in a dense fog with the vessel's whistle sounding every minute we heard a slight sound as of a distant whistle to seaward. The two or three following were heard more clearly, perhaps because attention was excited. The vessel suddenly passed out of the thick fog into a space where the fog was lifted

two or three hundred feet above the water, and on the western edge of this comparatively open space a very dense and heavy mass of fog lay upon the water. We were satisfied there was no vessel within reach, and that this sound was really the echo of the vessel's whistle which came from this mass; but we were then rapidly passing it and heard no sound in that or any other direction.

At another time, when the weather was very foggy, no wind, and a very large swell on, the steamer's whistle was sounded every minute and we heard a short, sharp, but faint hiss, as it were, very close to the vessel. When the fog would lift a little, so that the run of the swell was visible, we were satisfied this sharp hiss was part of the scream of the steam-whistle reflected from the wave under certain conditions difficult to determine.

Another peculiarity of the steamer's whistle has been noted by one of the Light-house vessels off Point Arena. In coming from the northward in a thick fog and when approaching Point Arena the sound of the fog-signal was heard, not on the port bow, as was expected, but off the starboard quarter; as the vessel moved southward the sounds came off the starboard beam, and the vessel then entered an open space whence the Light-house was seen, and the sounds then came properly from the right direction. A previous and very similar experience was reported by a coasting steamer under similar conditions; and the master, believing the vessel was in the bight north of the Light-house, stopped and backed out a good distance, and then continued on her course.

ANCHORING ON THE BAR.

A vessel should not anchor on the bar if she can possibly avoid it; frequently a heavy ground swell sets in without wind, and if the current is running strong ebb it allows little chance of escaping from an uncomfortable berth. The United States sloop of war *Vincennes*, during the cruise of the Exploring Expedition of 1841, anchored on the bar in a calm, and when the flood current made, it brought a swell that broke over her. In 1850 the surveying schooner *Ewing* put her anchors on the bar at the close of a heavy southeaster in December. In 1882 we watched an English ship rolling very heavily at anchor on the southern part of the bar, and finally she was compelled to make sail for safer quarters. Beechey in his narrative (Vol. I, p. 345) says that when crossing the bar the depth of water gradually diminished to five fathoms:

> "This would have been of no consequence had it not been for a swell which rolled so heavily over the bar that it continually broke; and though our depth of water was never less than four and a half fathoms, the ship [*Blossom*] on two or three occasions disturbed the sand with her keel. The tide [current] was unfortunately against us, and the swell propelled the ship just sufficiently fast for her to steer without gaining any ground, so that we remained in this position several hours."

Some of the deeper laden steam-ships in going out over the bar, when it was very heavy or even breaking, have touched the bottom when pitching deeply in the trough of the sea. In former years sailing vessels in thick southeast weather, when unable to determine whether the bar was breaking badly and taking advantage of a large ebb, have been forced to cross it in the face of the great combers, and have had their decks swept fore and aft, but got through. We were once on the bar with a light wind, very large swell, and ebb-current. The swell threw the vessel back about as fast as the current carried her outward.

LEAVING THE HARBOR OF SAN FRANCISCO.

In beating out against the usual summer winds, vessels start on the last quarter of the flood, make the first tack to the northward of the Blossom Rock Buoy, and weather it on the second; thence they work between Alcatraz Island and the south shore, because the influence of the ebb current is first felt there, avoiding Arch or Bird Rock, one mile west of the south end of Alcatraz. In tacking under the south shore west of Anita Rock, a vessel must not stand in closer than the range of Old Boneta Light-tower on with the extreme end of Fort Point, and thus avoid the gravel bank with only five feet upon it, which lies one-quarter of a mile west-southwest from Anita Rock. Vessels give Fort Point a good berth, and the ebb-current will carry them past it rapidly, but with a strong tendency towards the south shore; then two more tacks will carry them clear of the Heads." If the fog should set in while beating out, a vessel must be careful to keep well over towards the northern shore of the Golden Gate to avoid Fort Point and the Mile Rocks under the south shore. If the vessel is bound to the northward, and the weather shuts in thick with the wind from the northwestward, she makes a tack off shore to the southward of the Farrallones; if the weather be clear, short tacks are made off shore until she works up to Point Reyes, because the sea to the leeward of that headland is much smoother and the current less than outside the

Farallones; in fact she may have a slight current in her favor. When up with Point Reyes, vessels generally stand off until a course can be made for their port.

Large sailing vessels nowadays never beat out through the Golden Gate; they are towed outside the Heads by steam-tugs which generally release their tow abreast and south of the buoy near the east end of the Four-fathom Bank, when the vessels, if in ballast or with light loads, make all sail and cross the bar anywhere to the southward and westward that the wind will permit. If the vessel is deeply laden she will set her fore and aft sails only, and by keeping close to the wind let the ebb current carry her out over the bar through the Main Ship Channel, when she will make all sail and stand off. If the breeze is strong and well to the westward this is not practicable. The best course then to pursue is to make all sail as soon as she has passed Point Boneta, and when the Point bears north or north by east (N. or N. by E.) cross the bar by the South Channel on a south or south by west (S. or S. by W.) course; or she may steer south and keep Point Boneta Light bearing north until Lime Point is on with the western point of Angel Island, and cross the bar on that range in five and a quarter fathoms three miles off shore nearly abreast of the Ocean Side House. The pilots also use the range Raccoon Strait open by Lime Point and between the two Seal Rocks off Point Lobos. Of course only a narrow part of the Raccoon Strait is visible. When across the bar, in ten fathoms of water, she may haul off close on the wind; or, if bound off the coast to the southward, square away on her course. This way of crossing the bar to the southward is not generally practiced by ship-masters or the pilots because the vessel makes a course somewhat parallel with a lee shore and with the swell; but it is manifestly safer than to risk a very deep-laden vessel striking in a large swell any of the four and three-quarter fathom lumps on the bar to the southward of the Main Ship Channel; moreover it is not recommended unless the breeze is too strong for a vessel to pass out on the usual course of southwest by west (SW. by W.) from mid-channel between the Heads. The pilots cruise near the Main Ship Channel, and a vessel crossing the bar on a south course from Point Boneta will drop her pilot six or seven miles to leeward of the usual cruising ground.

THE TIDES AT SAN FRANCISCO.

The tides of the Pacific Coast of the United States are apparently of so complicated a character that it is deemed best to give here a general statement of the order of their recurrence and the means of determining them, for the benefit of those navigators who may not have the published tables* of their predicted times and heights.

There are in each lunar day, of twenty-four hours and fifty minutes, two high and two low waters, which generally are unequal in height and occur at unequal intervals. The low and high waters follow each other thus:

From the lower low water ("low water large")† the tide rises to the lower of the two high waters ("high water small")†, then falls to a low water ("low water small")† that is higher than the preceding low one (which fall, however, is sometimes so slight that it is indicated by an apparently long stand), then rises to the higher high water ("high water large"),† when it falls again, through a long interval, to the lower low water.

These movements and intervals may be more specifically stated thus:

From the lower low water ("low water large") the tide rises for about seven and a quarter hours say four and four-tenths feet to the smaller of the two high tides ("high water small"); then falls one and four-tenths feet in less than four and a half hours to the "low water small," which is higher than the preceding low water; then rises say two and nine-tenths feet in six and a quarter hours to the higher high water or "high water large;" it then falls again five and eight-tenths feet in over seven hours to the lower low water or "low water large."

Instead of the above figures the fall from the "high water small" (or "half tide") to the "low water small" may range from three and a half feet at one position of the moon to three-tenths of a foot at another; in the latter case there will be apparently a long stand of about five hours.

*These tables are published about the middle of the year preceding their date, and give the height and time [illegible] throughout the year for six of the principal ports on the Pacific Coast; with constants for every other harbor. They also give the age of the moon and the dates of apogee and perigee, the dates of greatest and least declination, and of zero declination.

†The terms by which they are usually known on this coast.

The heights of the low waters are therefore so unequal that at certain periods a rock whi has three and a half feet on it at one low water (the half tide or low water small) may be aw at the next succeeding low water.

These peculiarities are graphically shown in the page of tidal curves herewith presented.

These inequalities depend upon the moon's declination. They disappear near the time of t moon's declination being zero, and are greatest about the time of its being greatest, either no or south. The inequalities for low water are not the same as for high water, though they dis pear and have the greatest value at nearly the same times.

When the moon's declination is north, the higher of the two high tides of the twenty hours occurs at San Francisco about eleven and a half hours after the moon's transit; and w the declination is south, the lower of the two high tides occurs at about that interval. The lo of the two low waters of the day is the one which follows next the high water.

The Corrected Establishment, or mean interval between the moon's transit and the time of water, at North Beach, San Francisco Bay, is 12h 07m. The mean rise and fall of tides is fi and seven tenths feet; of spring tides, four and five-tenths feet; and of neap tides, two and tenths feet. The mean duration of the flood is 6h 35m; of the ebb, 5h 50m; and of the stand 31 The average difference between the Corrected Establishment of the a. m. and p. m. tides o same day is 1h 28m for high water, and 0h 38m for low water. These differences when the m declination is greatest are 2h 30m and 0h 48m. The average difference in height of these two is one and one-tenth feet for the high waters, and two and two tenths feet for the low wat When the moon's declination is greatest, those differences are one foot and a half and three seven-tenths feet, respectively. The average difference of the higher high and lower low w of the same day is five and two-tenths feet, and when the moon's declination is greatest, s one-tenth feet. The higher high tide in the twenty-four hours occurs about 11h 22m aft moon's upper transit (southing), when the moon's declination is north, and about 1h 02 when south; the lower of the low waters, about 7h after the higher high tide. The gr observed difference between the two low waters of one day was five and three tenths feet the greatest observed difference between the higher high and lower low waters of one d nine and ninety-three one hundredths feet, on February 8, 1876, when it ran out in 6h 43m; next day there was a fall of eight and twenty-seven one-hundredths feet in 6h 33m. The predicted normal fall of each of these tides was six and two tenths feet, and the times 6h 44m and 6h 33 tides of this exceptional rise and fall are very infrequent.

The two tides of the same day are generally unequal in proportion to the moon's decli In the absence of the annually published tables the time and height of the tides can be ob approximately from the following table:

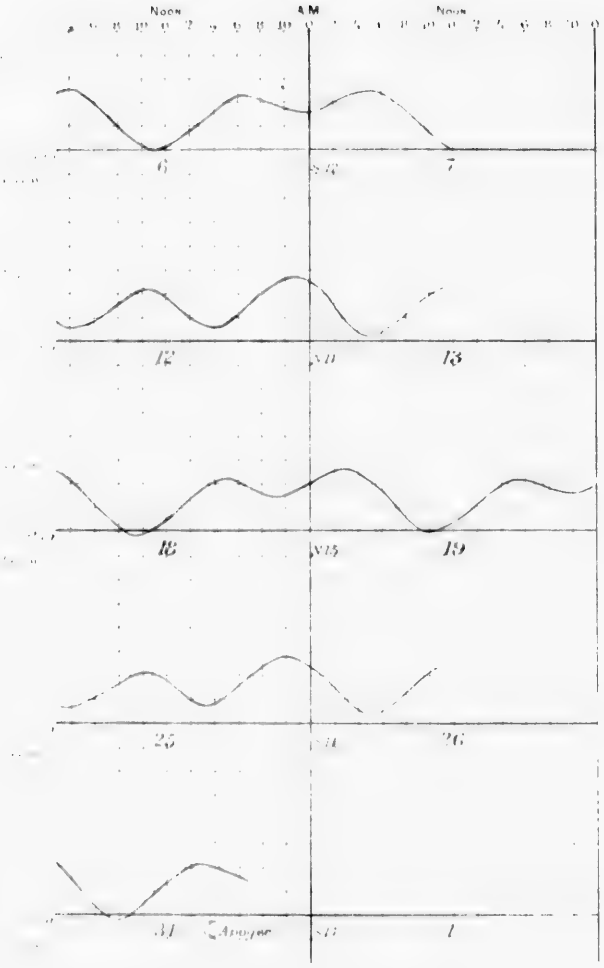
Moon's declination	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water		Low water		High water		Low water	
	Interval	Height	Interval	Height	Interval	Height	Interval	Height
	H. M.	Feet	H. M.	Feet	H. M.	Feet	H. M.	Feet
Greatest north	2 4				14 54	4.1	17 09	
Zero	11 44	4.7	17	0.8	11 34	4.7	17 25	
Greatest south	1	4.1	7 19	2.6	16 4	5.5	17 50	0

The interval is to be added to the time of the moon's meridian passage to give the time of high and low water. The time of the moon's upper meridian passage is given in the above the time of its lower meridian passage is very nearly the middle between two successive passages. The heights are given in feet and tenths, and show the rise above the low average of the lowest low waters; to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be three tenths foot higher than the above, and the low waters four-tenths of a foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be three tenths lower, and the low waters will not fall as low by four-tenths of a foot.

The high water makes at North Beach thirteen minutes later than at Fort Point, and tenths of a foot lower. The low water makes twenty six minutes later, and is one-tenth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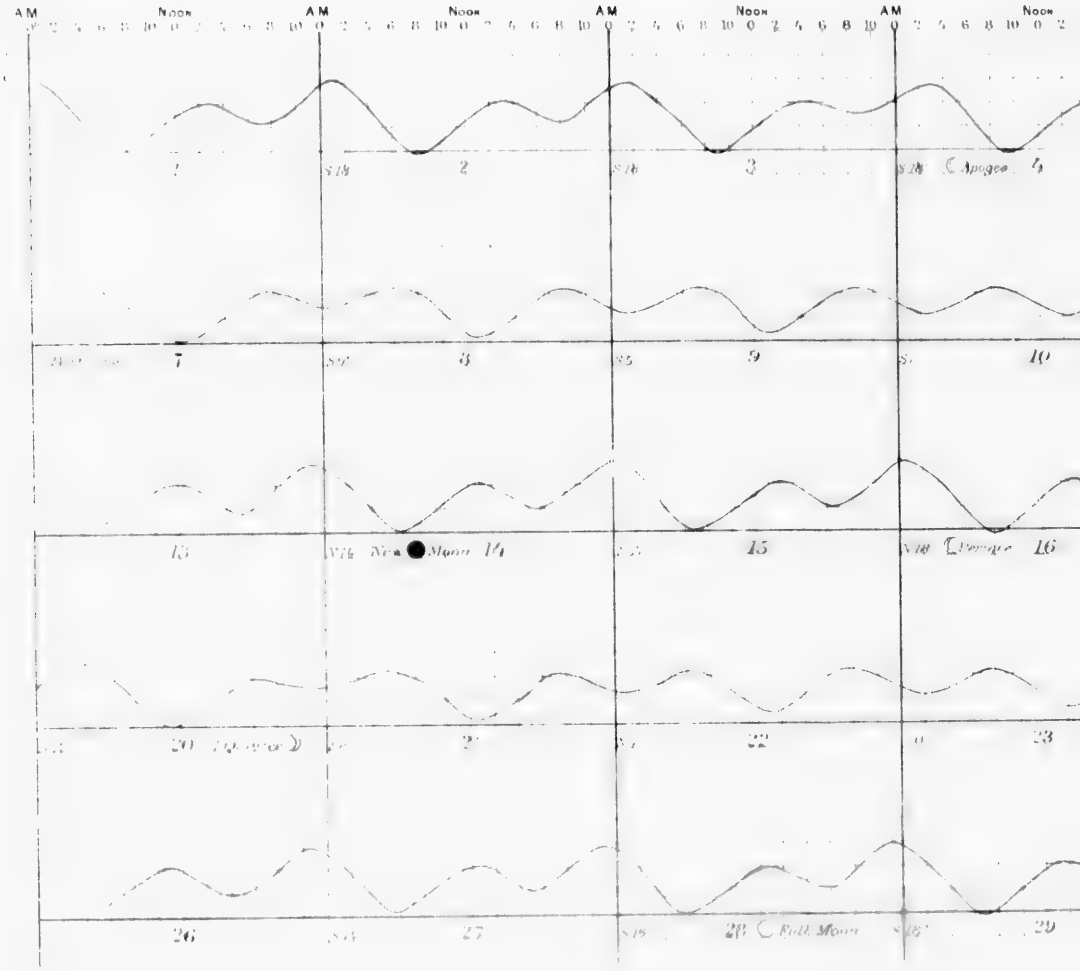
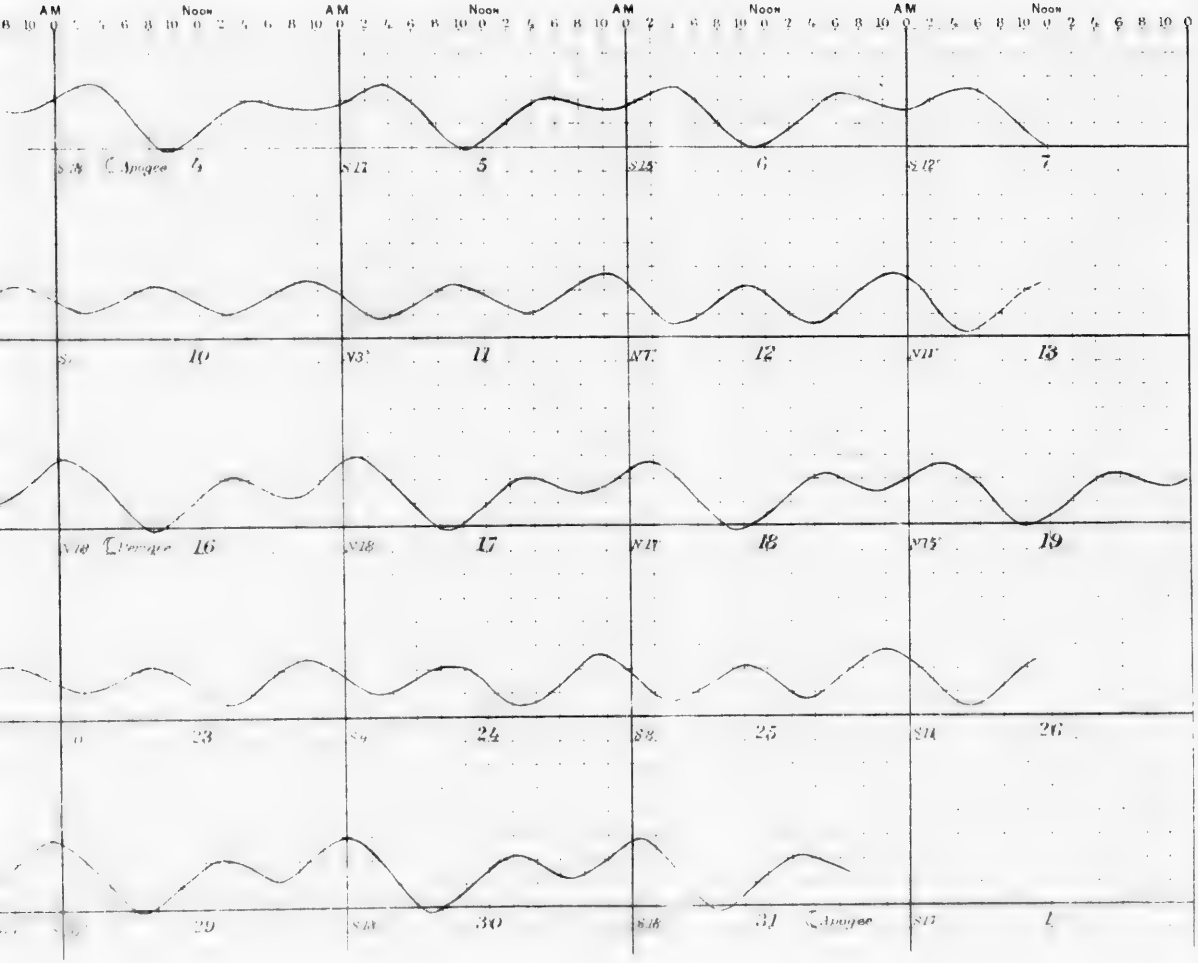
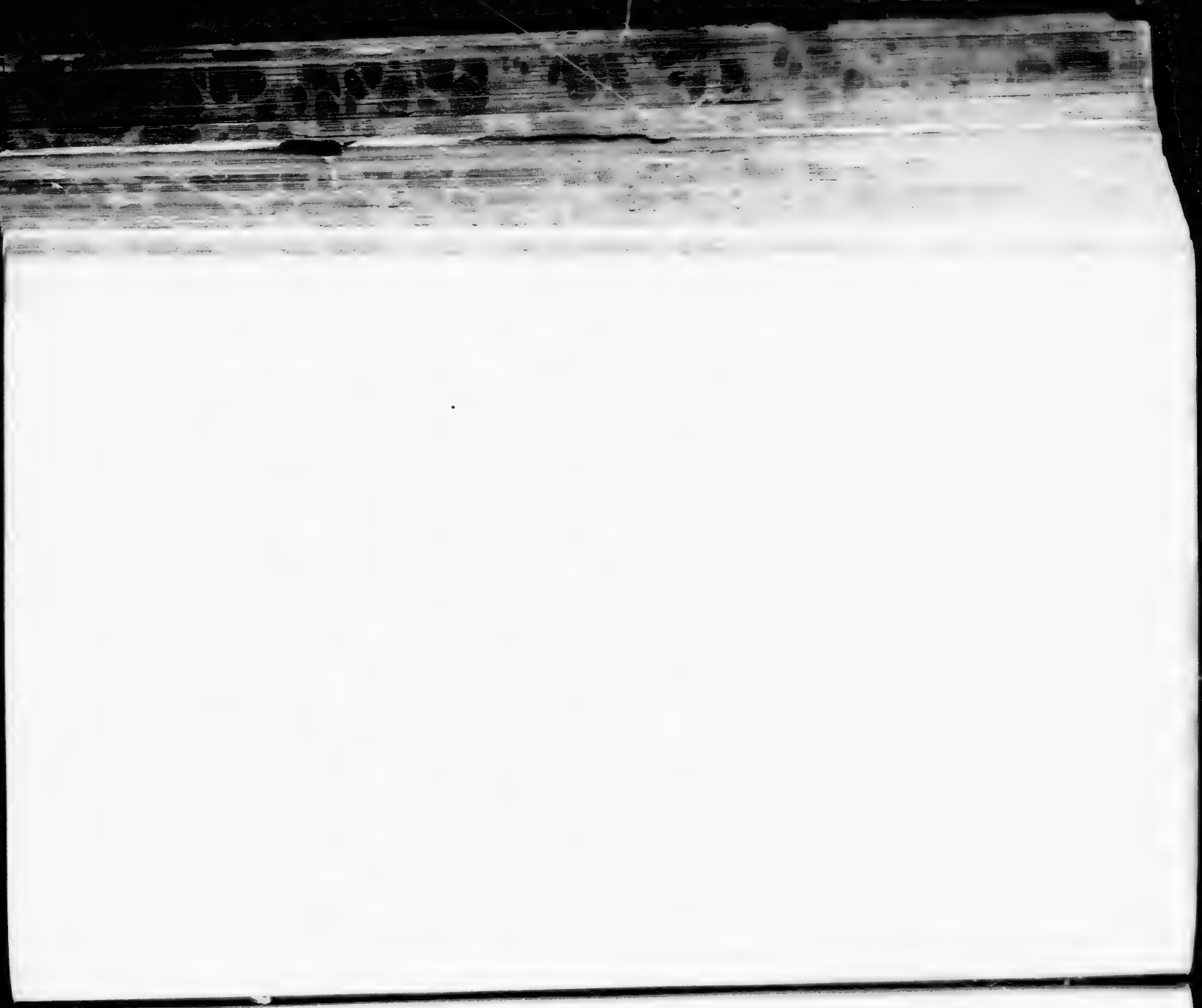
The times and heights of the High and Low Wa



of the High and Low Waters at San Francisco, May 1885





San Bruno Mountain, E. ½ S., 12 miles.

Approaches to the Entrance of San Francisco Bay (from the Buoy off the Bar).

Montara Mountain, 1,940 feet.
Point San Pedro, SE. ¼ E., 12 miles.

Range. Mile Rock. San Bruno Mountain, 1,325 feet

Old Boneta Light-tower. Point Boneta. Blue Mountain, 927 feet. Point Lobos. Seal Rocks. Ocean Side House Montara Mountain, 1,940 feet. Point San Pedro

Fog-Signal. Light-house. Windmill on Point Lobos, SE. ½ E.

Forward Range for the Boneta or North Channel. (View taken when abreast Tennessee Cove, 2 miles from Point Boneta.)

Point Reyes Light-house Bonita Point Duxbury Reef Bolinas Bay. Range. Point Reyes Ridge Point Boneta Light-house

Back Range of the Boneta or North Channel (taken on the Range, ½ mile South of Point Boneta) Rocky Point, and highest visible peak, NW. by W. ½ W.

lower. The high water makes at Saucelito twenty-two minutes earlier than at Fort Point, and [illegible]nth of a foot higher; the low water makes eight minutes later, and is two-tenths of a foot lower.

This peculiarity of the Pacific Coast tides was first noticed by Heceta and Bodega in June, 1775, when they made a survey of Port Trinidad.*

THE CURRENTS IN THE GOLDEN GATE AND APPROACHES.

The main drift of the waters off the coast is from the northwestward, being in part the flow of the waters of the great Japan stream after striking the northwest coast.

Immediately outside of the Golden Gate there is a continuous, although generally slight, current along the coast-line to the northward known as the *eddy coast current*, and to which the formation and existence of the bar is in part attributed. But the currents most affecting navigation in this vicinity are the usual tidal currents. Across the bar the flow of the tidal waters converges towards the entrance between the Heads with a preponderance from the southward. The flood current is felt sooner around Point Lobos than around Point Boneta, and around both points earlier than across the Main Ship Channel. Close around Point Lobos the young flood makes earliest, and the green water forcing its way close along the shore is in very marked contrast with the discolored water of the bay running out. Moreover, from the tidal peculiarities exhibited on the self-registering gauge at the high and low waters, it seems certain that the subsurface current is the first to force its way in and out. The preponderance of the ebb current is towards the west and northward because the march of the coast tidal current and the movement of the coast eddy current are both to the northward. The indications from the form of the bottom between the Heads and outward are that the main mass of the ebb waters divides into two principal streams, one towards the southward and the other towards the west-southwestward under the south side of the Four-fathom Bank. This latter current crosses the bar at the Main Ship Channel, but we have no direct measures of its velocity.

The deep Boneta Channel between the eastern end of the Four-fathom Bank and Point Boneta has not been thoroughly studied, and its peculiarities are therefore not fully known. During ebb-tide between the Heads, a current buoy was dropped on the edge of the Four-fathom Bank about one mile west-northwest from Point Boneta and observations made upon its drift. This current was then running southeastward, as if a flood current, along the line of the channel until it encountered the main ebb-current passing west by Point Boneta. Even then the subsurface indications were that the incoming eddy current was prevailing. Small coasters report the current running in on both the ebb and the flood.

The flood current runs longest under the shore between Point Lobos and Fort Point, and however the ebb current is running outside Fort Point, this late flood and the eddy under Fort Point will carry a vessel in with light airs and calms close under the fort, but upon pushing out into the Golden Gate the ebb will be apt to carry her bodily out.

In Boneta Cove, between Point Boneta and Point Diablo (where anchorage may be had in [illegible]ms, gravelly bottom), there is much less force of the current than in the opposite bight [illegible]g the Mile Rocks, around which the currents run very irregularly and very strongly. A [illegible]es after slack water at the Mile Rocks the current runs two and a half miles per hour. [illegible] Heads generally the currents run very strong, with deep whirling, boiling eddies, heavy [illegible]overfalls at the large tides during strong winds. Between Fort Point and Lime Point [illegible]measured the ebb surface-current running with a velocity of six and six-tenths miles per [illegible]st the subsurface currents have been measured running over eight miles per hour. [illegible]ocities are not surprising when it is recollected that the tidal waters of San Francisco, [illegible] and Suisun Bays, embracing four hundred and forty square miles, must pass through [illegible] subsurface gorge of the Golden Gate in the time of each tide.

[illegible]od water inside the Golden Gate runs mainly to the north-northeast and to the north [illegible]thus a very strong current is found setting under the north slope of the Presidio Shoal [illegible]e Arch and Shag Rocks. Around these dangers are violent and irregular swirls, and [illegible]gs indicate deep scourings. A vessel coming in with a strong flood current and light [illegible]refore in danger of being carried on either of these rocks.

* [illegible] exploracion de la Costa Septentrional de la California en 1775 con la Fragata Santiago y Goleta Senora [illegible] el Teniente de Navio Dⁿ Bruno de Heceta, y el de Fragata Dⁿ Juan Francisco de la Bodega y Quadra, [illegible]to de San Blas hasta los 58° de latitud.

At a station between Fort Point and the Presidio Shoal buoy when the stand of the large high water occurred at Fort Point the slack of the current occurred at the same time. When the stand of the small high water occurred the slack of the current was more than one hour earlier. At the stand of the large low water the slack of the current was an hour and a half later, and at the stand of the small low water the current changed more than an hour after. Thus the ebb is seen to run out much longer than the flood runs in in this locality. The fact that the ebb current makes earlier along the south shore inside the Golden Gate is well known to all the coasters who work out close under that shore on the latter part of the flood and pass Fort Point at the earliest practicable stage of the slack flood current. It is generally estimated that the ebb current makes an hour earlier on this south shore than at Sausalito.

A very strong flood current sets through the Raccoon Straits, with strong swirling and boiling eddies; and the ebb current also comes very strongly through the strait from the upper bay and striking Yellow Bluff and Point Cavallo is thrown over towards the Presidio Shoal and causes irregular and strong currents around Fort Point.

Off the city front the currents run with a direction generally parallel with the shore-line, and a quarter of a mile off the north sea-wall they reach two and a quarter miles per hour at half and three-quarters ebb on the large low water, whilst near Blossom Rock they fall below one and a half miles per hour with a strong overfall. Along the south shore the current of the large low water is nearly two and a half miles per hour at the half and three-quarters ebb.

Between the city front and the southwest side of Yerba Buena Island, the currents run with greater velocity than at any of the before-mentioned points. On the large low water, at half ebb the current runs two and three-tenths miles per hour; at three-quarter ebb, two and eight tenths miles; and at the stand two miles. At the small low water these quantities for the same periods are one and eight-tenths, one and eight-tenths, and one and a half miles per hour. At the large flood the current reaches one and eight-tenths for half the tide. One mile east of Rincon Point in ten and a half fathoms the ebb current reaches two and eight tenths miles per hour at three-quarter ebb of the large low water, and one and seven-tenths at the small low water; at the large flood the current reaches two and one-tenth miles at half flood, and at the same period of the small flood the current reaches two miles per hour.

The above remarks are generalizations from actual observations; but from the ever-changing conditions in every part of the bay the relations of the currents and the tides vary.

THE TEMPERATURE OF THE WATER OF THE GOLDEN GATE.

At the tidal station at Fort Point, on the south shore of the Golden Gate, and at Sausalito on the north shore, where it was subsequently located, the observer notes the temperature of air and water several times each day. A tabulation of the temperature of the surface water of the air has been made for the seven o'clock morning observations from the daily record ten years extending from January, 1874, to December, 1883. This condensed table shows the lowest temperature of the water is for the month of January, 50°.49 Fahr., and the h for the month of September, 59°.68 Fahr.; and thus the average range is only nine degrees lowest monthly temperature observed was January, 1883, when it reached 47°.9, and the h in August, 1880, 61°.1. The highest range in January was 53°.9 in 1878; and the lowest tember was 57°.9 in 1874.

The temperature of the air follows very closely that of the water, being 47°.8 for Januar 58°.8 for September; but the month for the highest temperature was June, being 60 tables, however, clearly indicate in detail the great uniformity of the temperature of the this part of the coast, and of the air within fifteen feet of the surface of the water.

To further show the regularity of the daily change of the temperature of the water, a tabulation is made for the month of January, about the middle of which month the temp of the water arrives at its lowest stage, for a period of eleven years from 1873 to 1883 in The decrease and then the increase during the month are quite small, but almost uniform.

It is this uniformity of temperature of the sea-water along the Pacific Coast and its le perature which conspire with alternating warm and comparatively quiet periods and northwest winds to give the peculiar foggy conditions which prevail during the summ and autumn.

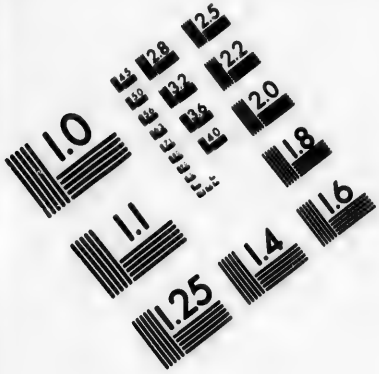
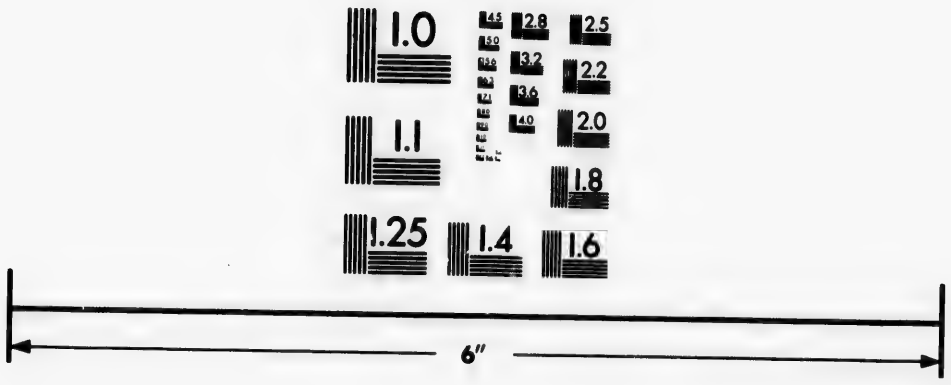
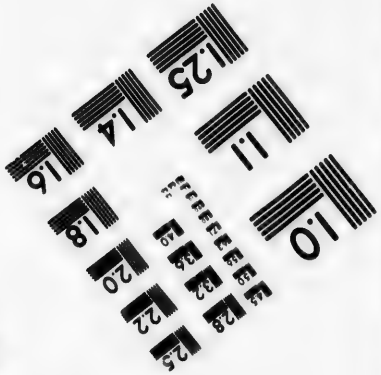


IMAGE EVALUATION TEST TARGET (MT-3)





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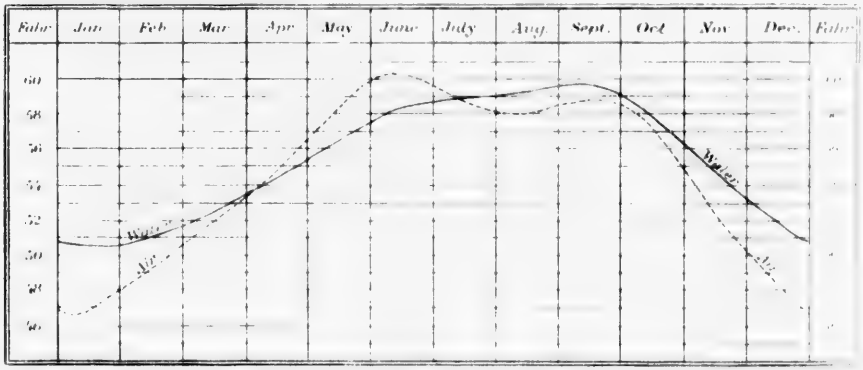
Temperatures of the WATER and the AIR in the Golden Gate at 7 A.M. for ten years 1874-83



Abstract of the daily temperature of the water and air in the Golden Gate. Observations made at 7 a. m.

[Temperature of the water, Fahr.°]

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly means.	W.–A.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°
1	49.7	49.5	50.2	52.3	55.7	57.0	55.6	57.0	57.9	57.5	55.5	52.2	54.18	+0.30
.....	48.9	50.3	49.6	51.4	54.9	56.2	56.2	59.4	56.8	58.7	.....	51.5	54.66	+0.28
.....	50.2	50.8	52.3	53.4	55.7	56.5	58.6	57.6	59.4	57.9	56.6	52.8	55.15	+0.42
.....	51.7	54.9	50.0	54.4	55.9	58.8	60.0	60.1	60.0	57.8	55.6	54.2	56.62	+1.19
.....	53.9	53.9	55.5	57.3	57.3	58.6	58.3	58.7	60.4	58.9	56.7	52.3	56.81	+1.12
.....	49.7	52.6	55.4	56.6	56.6	58.4	58.9	59.9	60.8	59.2	54.9	51.4	56.19	−0.26
.....	49.2	49.0	50.4	53.6	57.2	58.8	59.5	61.1	60.4	58.2	54.5	52.5	55.37	+1.44
.....	53.6	54.1	53.9	57.4	58.8	59.4	59.4	59.5	59.1	56.6	51.7	51.0	56.28	+1.00
.....	50.1	49.4	51.5	54.3	56.7	59.4	60.5	59.9	59.6	56.1	51.9	50.1	54.96	+1.09
.....	47.9	45.4	50.1	52.0	55.7	60.4	58.7	59.1	59.4	57.2	54.6	50.6	54.26	+1.00
Monthly means.	50.49	50.99	52.49	54.28	56.46	58.35	58.88	59.23	59.68	57.83	54.66	51.94	55.45	.....
W.–A	+3.60	+1.78	+0.51	−0.44	−1.87	−1.92	+0.10	+1.23	+0.82	+0.53	+2.26	+3.35	+0.82	+0.82

[Temperature of the air, Fahr.]

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly means.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1874	46.7	46.5	49.2	55.7	58.9	58.9	56.3	55.3	59.1	57.9	54.7	47.4	53.88
1875	46.8	49.4	51.5	54.0	58.2	58.7	56.5	56.6	57.0	59.0	55.3	49.5	54.38
1876	45.8	49.0	51.8	54.9	57.9	60.4	58.1	57.7	60.2	57.4	54.9	49.7	54.73
1877	50.6	55.1	55.2	54.3	56.8	62.2	59.5	57.7	58.4	54.8	51.4	48.4	55.43
1878	49.5	51.2	53.8	55.1	59.9	60.7	59.5	59.7	58.2	58.9	53.6	48.2	55.69
1879	47.1	52.7	55.2	57.6	58.7	61.1	59.7	60.8	61.7	62.1	53.9	46.8	56.45
1880	44.5	45.6	49.6	53.3	59.8	60.2	59.7	58.6	56.8	56.8	50.0	52.2	53.93
1881	50.3	52.5	52.7	57.2	58.7	59.1	60.7	58.0	58.8	55.3	51.4	48.7	55.28
1882	45.4	46.2	49.8	51.4	57.7	58.6	59.0	58.0	58.0	56.0	49.9	49.3	53.27
1883	42.2	43.9	51.0	53.7	56.7	62.2	58.8	57.6	60.4	54.8	49.9	45.7	53.08
Monthly means	46.89	49.21	51.98	54.72	58.33	60.27	58.78	58.00	58.86	57.30	52.40	48.59	54.61

Abstract of daily temperature of the water each day of the month of January for eleven years, 1873–'83.

From 1873 to 1883 inclusive.	Mean of daily temperature, Fahr.°	From 1873 to 1883 inclusive.	Mean of daily temperature, Fahr.°	From 1873 to 1883 inclusive.	Mean of daily temperature, Fahr.°
January 1 ...	51.1	January 12 ...	50.0	January 23 ...	50.3
January 2 ...	51.0	January 13 ...	49.9	January 24 ...	50.7
January 3 ...	50.9	January 14 ...	50.1	January 25 ...	50.5
January 4 ...	50.9	January 15 ...	50.2	January 26 ...	50.5
January 5 ...	51.0	January 16 ...	50.6	January 27 ...	50.5
January 6 ...	50.9	January 17 ...	50.7	January 28 ...	50.2
January 7 ...	51.1	January 18 ...	50.5	January 29 ...	50.5
January 8 ...	50.8	January 19 ...	50.3	January 30 ...	50.5
January 9 ...	50.9	January 20 ...	50.2	January 31 ...	50.5
January 10 ...	50 4	January 21 ...	50.5	Mean	50.34
January 11 ...	50.5	January 22 ...	50.0		

The graphical plotting of the temperatures of the air and water in the Golden Gate, exhibited in the last table, suggests the intimate relation existing between the periods of fog and the periods of greatest difference in temperature of air and water. When the monthly mean temperature of the air for ten years, observed at 8 p. m., was plotted on the same scale it was found to fall below the temperature of the water from April to September inclusive, and to be above it for the remainder of the year; but when the monthly mean of three daily observations, at 4 a. m., 12 m., and 8 p. m., for ten years was plotted on the same scale it was found to be practically the same as the temperature of the water during May, June, and September; to be above the temperature of the water from October to April inclusive, and to fall below the temperature of the water only in July and August. *July and August are the seasons of almost continuous fogs.* It would seem, therefore, that

whenever the temperature of the air falls below that of the water, which latter is very uniform, fogs are formed; and their density and continuance depend upon the preponderance during the whole twenty-four hours of a temperature of the air lower than that of the water.

THE WINDS ON THE PACIFIC COAST.

Sometimes it has been advised for a sailing vessel to work close along shore to northern ports during the summer northwest winds, and take the chances of land breezes to make latitude; but the attempt will be very apt to double the length of any passage. Baffling light airs and calms frequently exist along the coast, while vessels several hundred miles off shore have strong northwest winds; and when as far out as 140° longitude the wind veers to the northward, and even east of north, so that a vessel can head up very well. Moreover, along the coast we know that the current, after a prevalence of northwesterly winds, sometimes sets from one to two miles per hour from the northward, except very close under the shores. In our experience we have never yet met a wind off the land north of San Francisco, and very rarely indeed south of it, except in the region of the Santa Barbara Channel. As a general rule it may be safely stated that the lighter summer winds follow the line of the coast nearly, and gradually draw towards and over the land. In winter, with winds from the southward, this is not so marked; and yet no vessel with a reasonable offing has ever been driven on a lee shore.

From April to October, inclusive, the prevailing wind is from the northwest to west-northwest, changing to west in valleys opening upon the coast, but in no case so strongly as through the Golden Gate. During the summer the wind sets in strong about 10 a. m., increasing until nearly sunset, when it begins to die away. During its height it almost regularly brings in a dense fog, which, working its way over the peninsula, meets that already advanced through the Golden Gate and envelopes San Francisco and the bay by sunset. As a rule the breeze, unless very strong, does not dispel the fog. If a fog exists outside the wind is sure to bring it in, but the heated earth dissipates it for a time until the surface is chilled, and then the fog covers everything.

From November to March the wind is frequently from the southeast, blowing heavily for two or three days with a falling barometer, working round to the southwest, with a large and broken swell from the southwest, and weather thick, rainy, and squally. During the continuance of a "southeaster" the headlands can generally be made out when several miles distant. The weather is not cold but disagreeable; the first rise of the barometer indicates the breaking of the gale, and after the wind has changed to southwest for a few hours the clouds break their dull uniformity, the wind veers rapidly, the clouds dissipate, and the horizon clears. If the northwester continues the barometer rises very high. If the "southeaster" has blown a gale for several days an ugly cross-sea comes up as the wind veers to aid the long regular westerly roll of the Pacific.

During heavy continuous "southeasters" the sea breaks upon the San Francisco Bar from the Four-fathom Bank round to the south shore, presenting a fearful sight. It is probable that the heaviest breakers occasionally occur in seven fathoms. The roar on the bar can be heard at the anchorage off the east front of the city; and the permanent self registering tide-gauge at Sausalito records the character of the breaking, whether heavy or otherwise.

During some winters a hard "norther" will spring up and blow steadily and strongly from four to five days, with a clear blue sky, and cold bracing weather. Winds rarely blow from points between north, round by east to southeast. But the autumn of and winter of 1870–'71 was a marked exception, easterly and northeasterly winds prevailing. During the fall of 1870 the whaler from the Arctic Ocean, bound to the Sandwich Islands, had such a succession of easterly winds that they all fell to leeward of the islands. In the winter of 1882–'83 there was an unusual prevalence of northerly winds; and very frequently the prevailing wind for December and January is from the north.

The further north we advance the heavier blow the gales in winter. The winter gales of the coast have their origin to the northwest, and we may know whether the center of a storm is to the northward by the direction of the wind. If the wind is from the southward the center of the storm is to the northward, and this is the reason why a heavy southeaster frequently commences two or three days to the northward before it reaches San Francisco. With the northwest wind comes the normal barometer, and hence it is remarked that the northwest winds are not predicted by the barometer, but those from the southeast are almost invariably indicated by the barometer falling an inch from its normal height of nearly thirty inches. In the latitude of San Francisco the premonitory fall may, however, be only two or three tenths of an inch. When the barometer

begins to rise, the wind may be expected soon to shift round by the west to northwest, and to decrease. Only in one instance in our experience have we had a strong southeaster for a day with a high barometer, and that was off the Strait of Juan de Fuca when we had very heavy southerly weather and a frightful sea for seven days.

On the summits of the mountains bordering the coast, light, warm, very dry, variable and easterly airs are frequently experienced whilst the northwest winds are blowing freshly on the seaboard. On Ross Mountain, only three miles from the coast and rising twenty-one hundred and ninety seven feet from the right bank of the Slavianska or Russian River, we found light variable airs when strong northwest winds were blowing over the ocean. Upon Sulphur Peak, in latitude 38° 16', and twenty-six miles from the coast, we have had fresh breezes from the east-northeast, with differences of thirty-four degrees Fahr. between the wet and dry bulb thermometers, whilst the usual northwest winds were prevailing along the coast. Upon Mount Tamalpais, on the north peninsula of San Francisco Bay, the wind is the same as outside and through the Golden Gate, but not quite so strong.

THE FOGS ON THE PACIFIC COAST.

The summer fogs prevail upon the coast from June to September, and in some seasons they are almost continuous and very dense. They extend along the whole seaboard from the Aleutian Islands, Alaska, British Columbia, etc., and at times reach as far south as Cape San Lucas. They frequently stretch several hundred miles seaward and appear to mark the presence of the cooled waters of the Kuro Siwo or Japanese Warm Stream after it has given up its heat in the higher latitudes. At times they appear local, and exist in the vicinity of the great wind gaps along the coast, whilst the prominent capes, headlands, and coast peaks are free.

When these long-continued fogs prevail they lie directly upon the water, and objects are invisible at the distance of a ship's length. As a rule they are only light at sea, but increase in density as they reach the warmer shores. Such fogs are wet, cold, and penetrating; they pass through the wind gaps and reach the valleys of the interior, sometimes drawing into and covering large areas of the Great Valley of California. These fogs attain an average height of fourteen or fifteen hundred feet above the sea, and sometimes rise as high as twenty-six hundred feet, enveloping such peaks as Mount Tamalpais, Ross Mountain, etc. When the observer is on the mountains he will occasionally see the fogs dissipated along the immediate coast-line after they have left the hills; but before the sea is uncovered, the heat of the day falls, and the fogs again develop and roll through every gorge and valley. Even if the fog clears away before noon and the atmosphere continues clear for a few hours, the condensation of the aqueous vapor again commences towards sunset. Sometimes large areas of the ocean are seen clear of fogs with great masses lying here and there; and frequently we have looked down into the Gulf of the Farallones and have seen great spaces clear of fog, which, however, was enveloping the group of the Farallones.

In the warmer days of summer, when there is little or no wind along the seaboard, the evaporation from the surface of the sea saturates the air with aqueous vapor, and there is little difference between the temperatures exhibited by the dry and wet bulb thermometers. At the same time the heat in the Great Valley of California and the adjacent valleys is very great and the air remarkably dry. After a few days of this excessive heat over the land and the calm at sea, the air from the ocean is drawn in through all the "wind gaps" to supply the place of the heated air of the interior valleys. When the movement commences, the air in contact with the surface of the ocean takes the lower temperature of the water, which ranges from 56° to 60° in summer, and immediately chills the aqueous-laden air above it and forms the fog which is then moved toward and over the coast shores.

Frequently the heavy fogs of summer are preceded by a very dark, blue haze that hides the details of the coast-line, especially in such a receding shore as that between Point Reyes and Point Lobos. It is then very difficult to estimate distances. Under the great mountain barriers, such as the Sierra Santa Lucia, this haze or a hazy fog will form close under the high precipitous shore and obscure the coast-line, but to the vessels three to five miles off shore the high peaks of the range are seen above this opaque atmosphere and utilized as landmarks.

Vessels sometimes encounter the summer fogs when they leave port, and make their trip without seeing the sun or land. In 1858 the surveying brig *Fauntleroy* made the passage from the Strait of Juan de Fuca to San Francisco and never got sight of the sun or the land for twenty-two days. Sailing vessels have laid off the mouth of the Columbia River four or five weeks without

knowing their position. We have been thirty-five days at Cape Disappointment without getting an observation at night on account of fogs. In July and August, 1859, there was a period of thirty-nine days of continuous fog recorded at Point Reyes, and during the first ten days of that period the sun was invisible, and after that only visible now and then overhead through the fog.

When such continuous fogs begin to dissipate, they clear away overhead in the warmest part of the day, occasionally allowing a sight of the water for a mile; on subsequent days the horizon may become visible and the fog remain longer away, but it closes down at night. They also become less wet, cold, and penetrating.

Sometimes this fog begins to lift bodily, as it were, and the horizon and the lower parts of the coast line become visible; and not unfrequently it lifts so that the under side of the fog-cloud is one hundred, or even two hundred, feet above the surface of the water. Although the shore may be visible it is extremely difficult to recognize localities under such peculiar aspects. This lifting of the fog does not necessarily continue all night, but may last long enough after sunset for a vessel to obtain sight of a light-house if it be low enough. Or a fog having many of these characteristics may form along the coast with a well-defined under surface that never comes down upon the water.

Off the Golden Gate we have seen the hulls of fifteen or twenty vessels and the line of rocky coast visible just beneath the fog-cloud, and have made Point Boneta clear to a height of one hundred feet while the higher parts were in impenetrable fog. From the experience of navigators on this coast and the officers of the Coast and Geodetic Survey working along the seaboard for over thirty years, the average height of the under surface of the lifting fog-cloud is estimated about eighty to one hundred feet above the water. To meet just such conditions the Light-house on Point Boneta was changed to a lower position, and the Lights on the coast are being placed as low as practicable for this very reason.

During the prevalence of these fogs the wind is moderate, light, or calm; they may break up without wind and the weather become mild and pleasant with little wind. Or strong northwest winds may come up and drive away the fog, bringing clear skies and the regular northwest swell of the Pacific.

In winter, the fogs are replaced by the thick, murky weather of the "southeasters" which bring up rain and squalls, but through which headlands may be made out when several miles distant. Fogs do occur in winter, but they are exceptional and do not last long.

To the observer on the mountains the great fogs appear as an ocean of cloud, through which the summits of the higher mountains appear as islands; it is from stations on the coast mountains that we have determined the height of the upper surface of the fog-cloud and their routine of changes.

In the fogs of summer and the thick weather of winter the steam fog-whistles at the Light-house stations on the coast are to be relied upon for obtaining a vessel's position, as the Lights can not be seen through the fogs. But the distance can not always be judged by the loudness of the sound.

Some curious results have been developed by the United States Light-house Engineers on this coast from the running of the fog signals. The persistence of fogs may be measured by the aggregate time required in giving warning signals during fogs; and the monthly and yearly means of the hours so employed at the different stations give their relative liability to fogs. The important fact has been emphasized that the locality of maximum fog lies between the Heads of San Francisco and Point Reyes, or within the northern part of the Gulf of the Farallones. This had been our experience in two seasons' occupation of Mount Tamalpais. North of Point Reyes the decrease of frequency of the fogs is not so rapid as to the southward of the Heads. At Point Arena Light-house, ninety-one miles from Point Boneta, the fog record shows a greater prevalence than at Pigeon Point Light-house or Point Año Nuevo Fog-whistle, respectively thirty and thirty-eight miles to the southward of the Heads.

But the decrease is not continuous to the northward because the "wind gaps" and other local circumstances cause much condensation, as for example at Humboldt Bay, where the low lands, the fresh-water streams, the long, low sand beach, and the leeward barrier of the Mendocino Mountains conspire to give an excessive amount of fog at the Humboldt Bay Light. It is very persistent at the Humboldt Bay entrance, while Trinidad Head and Cape Mendocino and the seaward horizon may be clear. A second example is farther north: Point Adams is at the mouth of the Columbia River, and in 1879 the fog-whistle was used less than half as long as at Point Boneta.

Point Adams is a low point with an extensive area of low country behind it, with the large river and its tributaries, and is also to leeward of Shoalwater Bay, where the fogs form earlier, according to our four months' experience in 1851. On the contrary, the Tillamook Light-house is on a rock abreast the mountainous coast to the southward of the Columbia River. At this station the fog-whistle was used about one-sixth the time it was in operation at Point Boneta. Compared with Point Adams the whistle at Tillamook was used only half the time of that point.

For the thirty-two months ending June 30, 1883, the average monthly use of the fog signal at Point Boneta was one-hundred and fifty-four hours, and for the Southeast Farallon ninety hours. This confirms our experience of the fog surrounding the islands being less than that covering the entrance to the Golden Gate.

For further remarks on fogs see Temperature of the Water in the Golden Gate, pages 228–230.

THE SEASONS.

There are but two seasons on the Pacific coast, usually denominated the dry and the rainy seasons; the former corresponding to the Atlantic summer, and the latter to the winter; but much error exists in regard to them, especially as to the amount of rain falling during the rainy season. The following totals of rain that fell at San Francisco during each rainy season since 1849 will show that the amount is not great. The point of observation was two hundred and ninety feet above the bay.

During the rainy season of—	Amount of rain-fall.	Number of days upon which it rained.	During the rainy season of—	Amount of rain-fall.	Number of days upon which it rained
	Inches.			*Inches.*	
1849–'50	33.1	53	1866–'67	34.9	71
1850–'51	7.4	51	1867–'68	38.8	79
1851–'52	18.4	65	1868–'69	21.4	62
1852–'53	35.3	70	1869–'70	19.3	57
1853–'54	23.9	82	1870–'71	14.1	46
1854–'55	23.7	70	1871–'72	34.7	79
1855–'56	21.7	56	1872–'73	18.0	51
1856–'57	19.8	63	1873–'74	24.0	85
1857–'58	21.9	56	1874–'75	18.4	45
1858–'59	22.2	69	1875–'76	26.0	69
1859–'60	22.3	74	1876–'77	10.0	46
1860–'61	19.7	71	1877–'78	31.1	68
1861–'62	49.3	83	1878–'79	24.6	68
1862–'63	13.6	54	1879–'80	26.4	69
1863–'64	10.1	37	1880–'81	27.5	61
1864–'65	24.7	59	1881–'82	15.6	68
1865–'66	22.9	69	1882–'83	19.8	54

Average precipitation of thirty-four rainy seasons = 23.4 inches.
Average number of days upon which it rained = 63.4.

The following table exhibits how the foregoing yearly amounts were distributed each month from July, 1849, to the end of June, 1883:

Mean monthly rain-fall.	Inches.	Mean number of days in which rain fell.	Summary for each season.		
June	0.08	0.9			
July	0.01	0.3	Total for the summer =	0.14 inches on	1.7 days.
August	0.05	0.5			
September	0.13	1.3			
October	0.78	3.2	Total for the autumn =	3.64 inches on	11.5 days.
November	2.73	7.0			
December	5.40	11.8			
January	5.12	10.3	Total for the winter =	14.13 inches on	31.0 days.
February	3.61	8.9			
March	3.04	9.3			
April	1.79	6.3	Total for the spring =	5.49 inches on	19.2 days.
May	0.66	3.6			
Average	23.40	63.4		23.40	63.4

An examination of the extended tables from which the above results are derived shows that, as a rule, the greatest amount of water falls in December and January; in fact nearly one-half of the whole precipitation of the year falls in those two months. In six Decembers of this period from ten to sixteen and three-quarters inches of rain have fallen; in three Januarys from ten and two-thirds to twenty-four and one-third inches of rain have fallen. It is also remarked that there is a very notable abatement during the rainy season, sometimes extending through more than a month; but this partial cessation of rain-fall takes place at different times in different years; the most marked and prolonged instances have occurred in January and February. For instance, in each of five Februarys half an inch of rain, or less, has fallen.

Although March virtually closes the rainy season, yet in April, 1880, there was a very marked period of southeast weather, with a downfall of ten inches of rain at San Francisco; and as late as May, 1883, three and forty-seven hundredths inches of rain fell at the same place. In June, 1884, there fell two and forty-four hundredths inches.

Upon the rain-fall of winter depends the great wheat and grain crops of California. With twenty-three inches of rain at San Francisco, the State with its present acreage is able to ship twenty-three millions centals of wheat, and the number of vessels carrying the crop to foreign ports has been as high as five hundred and forty-eight in one year, from July 1, 1881, to June 30, 1882.

It is a well established fact that the rain-fall on the seaward side of the mountain ranges on the coast-line is two and a half times greater than upon the eastern side of the mountains. And this general expression of greater precipitation holds good even on the western flanks of the Sierra Nevada. Moreover, the rain-fall is vastly greater at the northern extremity of the Great Valley of California than at the southern extremity, reaching one hundred inches at the town of Shasta and falling to three inches at the Kern River.

Towards the south the annual rain-fall decreases gradually to an average of nine or ten inches at San Diego and increases to the northward, reaching eighty-nine inches at the mouth of the Columbia River, and one hundred and twenty-five inches at the entrance to the Strait of Juan de Fuca. The number of rainy days increases also as we go north until there is rain-fall throughout the year, with, however, a great preponderance in winter. Northward of Cape Mendocino the rain-fall increases very rapidly, but is confined to a narrow belt of the coast. We have no measure of the rain-fall at sea for any given latitude.

Southward of San Diego the rain-fall decreases and the seasons change about the latitude of 28°, where we find the mountains frequently covered with masses of clouds looking much like rain, but little or no rain falls. This limited region of clouds and no rain is locally known to navigators as the "doldrums." South of latitude 28° the dry season occurs during the winter and the wet season during the summer. At San Jose del Cabo, in latitude 23° 04′, at the southern extremity of California, the rain-fall for several seasons averaged four or five inches.

In the region of San Francisco lightning and thunder are very rarely seen and heard, and only upon two or three occasions has snow fallen in that city. On the mountains along the sea-board snow sometimes falls, but with trifling depths, and it disappears in a day or two. Some of the navigators mention seeing snow on the sea-coast mountains. In January, 1880, the snow-fall along the entire coast was very heavy; but some winters pass without any.

BAROMETRIC INDICATIONS OF WEATHER.

Upon this coast, in the latitude of San Francisco, the barometer undergoes such moderate changes in winter that by it alone the character of the coming weather can hardly be predicted; but the navigator gathers from the appearance of the weather, the quarter where the clouds are gathering, the temperature and humidity of the air, the direction of the swell, and the peculiar soughing through the rigging, whether a southeaster is coming up. Further north the characteristics of the weather are more marked. The clouds generally bank to the northward, the wind is variable and light, the temperature and humidity of the air increases, the barometer sinks and steadily goes down below its normal height of 29.95, the wind settles from the southeast, the clouds grow heavier and darker, and in a few hours a "southeaster" is blowing. But this wind is rarely southeast even by compass; its general direction is parallel with the coast-line, and from of Point Concepcion the coast does not form a lee shore except where the shore trends westward as at Santa Cruz, Drake's Bay, etc. These instances are so limited in extent that with reasonable sea-room no vessel has ever been driven ashore on this coast in a southeaster.

If the barometer falls rapidly, a vessel may expect a strong gale from the southeast, with rain but not cold weather; and the gale will continue so long as the barometer hangs at its lowest point. We have found the least change upward from this low point to indicate that the direction of the wind will soon change. But sometimes when the barometer has reached its lowest point, say twenty-nine inches or thereabout, there may be a lull in the gale; in fact we have experienced (in one gale 48°) a dead calm at such a time, with a frightfully confused sea running; then without warning the gale would recommence with its old fury from the former quarter. This calm area marked the center of the cyclone; as a rule it is farther off shore than the average route of the coast traffic.

In these heavy southeast gales it is difficult to note the state of the mercurial barometer, because in some barometers the convex surface of the column of mercury sinks below the thin film of mercury which adheres to the inner surface of the tube and gives the deceptive appearance of a hollow or concave surface to the top of the column of mercury. The barometer may read much below the upper margin of this temporarily fixed film. The aneroid barometer, if in good working order, may be much more certainly relied upon.

With a barometer rising above thirty inches we may expect northwest winds if the temperature and humidity of the atmosphere decrease. Sometimes the barometer has risen on this coast to thirty and seven tenths inches with pleasant northwest weather, whilst we have experienced a five days' gale from the northwest with clear, blue skies, pleasant temperature, and barometer just above thirty inches. With such a blow, the northwest swell of the Pacific increases very largely, but preserving a regularity which any well found vessel can weather.

With the strong "northers" that sometimes blow in winter the barometer rises somewhat above thirty inches, the sky is clear and intensely blue, the atmosphere cold, but very dry and bracing, and such weather is said to be presaged by an unusual twinkling of the stars. These northers do not indicate any southerly weather, but more frequently follow a two or three days' rain with southerly weather.

Of the southeasters on this coast, it is found that they begin first at the northwestward and extend gradually to the southeastward. Their most violent exhibition near the sea-board is to the northwestward, outside the Strait of Juan de Fuca. In two or three days after a heavy southeaster develops about the Columbia River we may expect to experience it at San Francisco. Towards the Alaskan coast these storms are very violent and a very heavy and irregular sea accompanies them. These gales appear to rotate with a cyclonic motion, but their rate of progress and breadth are yet unknown, because they frequently extend far out to sea and there are yet very few means of tracing out the areas which they occupy and which they traverse.

TEMPERATURE OF THE AIR AND WATER ALONG THE SEA-BOARD.

The following tables will give a general idea of the temperature of the air on the sea-board. The interior is much warmer, but on account of the dryness of the atmosphere the effect is not so enervating to the human system as even a lower temperature on the Atlantic or Gulf of Mexico.

Observed mean monthly temperature for twelve years, from 1872 to 1883, by the Signal Service at San Francisco.

Season.	Month.	Mean temperature. Fahr.	Mean for season.	Season.	Month.	Mean temperature. Fahr.	Mean for season.
Summer	June	58.7	58.5	Winter	December	51.5	51.4
	July	58.3			January	50.7	
	August	58.6			February	52.0	
Autumn	September	59.8	58.2	Spring	March	53.6	54.8
	October	59.1			April	54.4	
	November	55.7			May	56.4	

Mean annual temperature for the above period 55°.4

Observed mean monthly temperature from seven years' observations, from July, 1877, to September, 1884, at Los Angeles.

Season.	Month.	Mean temperature, Fahr.	Mean for season.	Season.	Month.	Mean temperature, Fahr.	Mean for season.
Spring	March	55.4	58.3	Autumn	September	77.1	65.9
	April	57.8			October	62.5	
	May	61.8			November	58.0	
Summer	June	65.5	74.3	Winter	December	55.0	53.7
	July	78.1			January	52.4	
	August	79.4			February	53.7	

Annual mean temperature 63°.1; range, 25°.7.

Observed mean monthly temperature from twelve years' observations, from 1872 to 1883, at San Diego.

Season.	Month.	Mean temperature Fahr.	Mean for season.	Season.	Month.	Mean temperature, Fahr.	Mean for season.
Spring	March	55.7	58.1	Autumn	September	66.8	62.7
	April	57.7			October	62.0	
	May	61.1			November	58.3	
Summer	June	64.4	66.7	Winter	December	55.1	54.4
	July	67.1			January	53.7	
	August	68.7			February	54.3	

Annual mean temperature 60°.5; range, 15°.1.

The temperature of the immediate coast-line depends in great measure upon the temperature of the ocean waters moving past it from the northward, so that extremes of temperature are unknown in San Francisco, or at any of the seaports. (See tabulation of the temperature of the water in the Golden Gate, page 229.) In some winters the thermometer never falls to freezing, and rarely reaches twenty-five degrees. During the summer the temperature averages nearly sixty degrees, or a trifle more than that of the ocean water; but several times during the last thirty-five years the thermometer has risen a little above ninety degrees.

Temperature of the water.—From Cape San Lucas, in latitude 23°, to San Francisco, through fifteen degrees of latitude, the temperature of the sea-water decreases seventeen degrees in spring, twenty one degrees in summer, fifteen degrees in autumn, and fifteen degrees in winter. These numbers are, however, based upon only two years' observations, and must be considered as approximate only. The decrease is not quite regular, for it is found that south of Point Concepcion the change is somewhat sudden from the warmer water south, to the chilled water north of that point.

The highest temperature of the water occurs in the autumn at Cape San Lucas, as well as at San Francisco, but the range through the seasons is not great. The coldest water occurs at San Francisco about the middle of January, and from the tidal records the temperature of that month for eleven years was 50°.5. The highest temperature is about the middle of September when it reaches 60°. At San Diego the temperature of the water at La Playa may be taken as 5 degrees higher than at San Francisco, with the lowest temperature in January and the highest August.

Off the coast at San Francisco the temperature of the subsurface water at one hundred fathoms ranges from 45° to 47°. The average of the observations is very close to 46°.

For the greater depths, ranging along the whole coast, the temperature of the water at one thousand fathoms is 35°.6 Fahrenheit, and at two thousand fathoms 33°.7.

Temperature of the water on the Cordell Bank.—In 1873, from June 12 to 17, during the preliminary hydrographic survey, the temperature of the water on the Cordell Bank was noted four times a day—at 8 a. m., 2 p. m., and 8 p. m.—with the following results: Mean temperature of surface water at 8 a. m., 49° Fahrenheit, at 2 p. m. 51°, and at 8 p. m. 49°. The records of the tide station in the Golden Gate through eleven years give the morning observation of the surface temperature at that season of the year 58°.35 Fahrenheit.

On the Bank a few sub surface observations for temperature were made with the following results: At one hundred and fifty fathoms, 45°.5 Fahrenheit; at seventy-five fathoms, 48°.

DESCRIPTION OF LIGHT-HOUSES AND OTHER AIDS TO NAVIGATION ON THE INLAND WATERS OF SAN FRANCISCO BAY AND ITS SUBDIVISIONS, WITH GENERAL SAILING DIRECTIONS.

Alcatraz Island Light has been described on page 182; Yerba Buena Island Light, on page 181; Fort Point Light, on page 176; Lime Point Fog-signal, on page 179; Angel Island Fog-bell, on page 184; Presidio Shoal Buoy, on page 186; Blossom Rock Buoy, on page 187; Anita Rock Spindle, on page 186; Mission Bay Rock Buoy, on page 188; Sonoma Rock Buoy, on page 189; Yerba Buena Shoal Buoy, on page 188; Southampton Shoal Buoys, north end, on page 190; Southampton Shoal Buoys, south end, on page 189.

BERKELEY REEF BEACON.

This beacon is not in the line of the ordinary traffic of the bay but is two miles inside the western edge of the flats which make out from the Contra Costa shore. These flats are very level, and the depth of water ranges from five to seven feet over the greater part of them. The beacon is a pile driven into the bottom and has a *box on top painted in red* and *black horizontal stripes*. It is placed in seven feet of water about thirty five yards southwest three-eighths west (SW. ⅜ W.) from the Berkeley Reef, which is awash at low tides. From the beacon we give the following bearings and distances to surrounding objects:

West point of Brooks' Island	N. 57° W.	1¼ miles.
Point Isabel Wharf	N. 5 E.	1¾ miles.
West Berkeley Wharf	S. 84 E.	1⅞ miles.
Alcatraz Island Light-house	S. 39 W.	5 miles.

INVINCIBLE ROCK BUOY.

This danger lies on the eastern side of San Francisco Bay near Point San Pablo, and two-thirds of a mile from shore. It is one of several dangers in the same vicinity. It has eight feet of water upon it, with fourteen fathoms close to on the western side, and five and six fathoms north and south of it. Between it and the eastern shore of the bay is a good steamer channel with six to twenty fathoms of water. Just north of it lies the Whiting Rock, and still further north the rocky islets named "The Brothers," and a danger outlying therefrom with fifteen feet of water on it.

The rock is marked by a *second-class can-buoy* painted with *red* and *black horizontal stripes*. The buoy lies near the shoalest part of the rock, in thirteen feet of water, and may be passed on either side at a distance of fifty yards.

From this buoy we have the following bearings and distances to adjacent objects:

Whiting Rock Buoy, in 12 feet	N. by W.	300 yards.
East Brother Light-house	N. 19 E.	½ mile.
Point San Pablo, in range with Point Penole	N. 28 E.	⅝ mile.
Molate Point	S. 71° E.	1 mile.
Red Rock, 169 feet high	S. 31 E.	1⅝ miles.
Wharf at Point San Quentin	S. 47 W.	1¼ miles.
The Sisters, off Point San Pedro	N. 19° W.	1¾ miles.

WHITING ROCK BUOY.

The Whiting Rock lies on the eastern side of San Francisco Bay, near Point San Pablo, at the entrance to San Pablo Bay, and only two thirds of a mile from the shore. It is one of several dangers in the same vicinity. It has twelve feet of water upon it, and is of small extent. On the western side of the rock there is a depth of sixteen fathoms of water, and from seven to twelve fathoms on the other sides. There is seven fathoms between it and the Invincible Rock, and deeper water between it and the Brothers.

The danger is marked by a *second-class can-buoy* painted with *red* and *black horizontal stripes*. The buoy is placed near the shoalest spot (in eighteen feet of water) and may be passed on either side with safety at a distance of fifty yards.

From this buoy we have the following bearings and distances to adjacent objects:

Invincible Rock Buoy, in 8 feet	S. by E.	300 yards.
East Brother Light-house	N. 31 E.	⅞ mile.
15-foot rock, off the Brothers (red buoy)	North	750 yards.
Point San Pablo	N. 37 E.	⅞ mile.
Molate Point	S. 65 E.	1¼ miles.
Red Rock, 169 feet high	S. 30 E.	1¾ miles.
Wharf at Point San Quentin	S. 43 W.	2 miles.
The Sisters, off Point San Pedro	N. 20 W.	1⅞ miles.

BUOY NEAR THE FIFTEEN FOOT ROCK OFF THE BROTHERS.

This danger is a single rock, having only fifteen feet of water upon it, with fifteen fathoms close around it. It lies five hundred and fifty yards exactly north from the Whiting Rock Buoy and four hundred yards south seventy-eight degrees west (S. 78° W.) from the East Brother Light-house. The third quarter of the ebb sets directly towards this rock at the rate of one and three-quarters miles per hour. Before the buoy was placed near it vessels from San Pablo Bay going through the mid channel kept to the westward so as to open the Invincible Rock Buoy to the westward of the Whiting Rock Buoy before Point San Pablo bore east, but they may now pass close to the westward of the buoy.

This danger has been recently marked by a *first-class can-buoy* painted *red* and placed in seventeen fathoms of water two hundred and twenty yards west from the rock. Vessels should leave it on the starboard hand when going up the bay.

From the buoy we have the following bearings and distances to adjacent objects:

San Pablo Point Buoy, in 15 feet	NE.	¾ mile.
East Brother Light-house	E. ¼ N.	650 yards.
Red Rock, 169 feet high	SE. by S. ¼ S.	2¼ miles.
Wharf at Point San Quentin	SW. ¾ S.	2¼ miles.

*Point San Pablo** is the northwest termination of a ridge nearly five miles long on the eastern side of San Francisco Bay and parallel with the great ridge running northwestward from Angel Island and Raccoon Strait. It is seen as an island from the southeast and northwest because it is connected with the eastern main-land by a broad extent of low marsh land. The ridge is about one hundred and twenty feet high near the extremity, and reaches four hundred and ninety feet near the middle, when it suddenly falls to a sharp depression almost dividing it in two. Point San Pablo is the turning point from San Francisco Bay to San Pablo Bay.† It has a rocky front with ten fathoms close inshore on the west. Extensive shoals lie in the broad bay to the east and northeast of the point. "The Brothers" Light-house lies directly abreast of the point, distant only four hundred and fifty yards to the southwest.

SAN PABLO POINT BUOY.

The shoal water of San Pablo Bay lying east of Point San Pablo makes out northward from the point a little over one-quarter of a mile, and to mark the limit of the three-fathom bank for vessels using the narrow but deep channel between the point and the East Brother a *third-class can-buoy* painted *red* and *numbered* 2 has been placed in fifteen feet of water five hundred and ten yards north three quarters west (N. ¾ W.) from the point. It is on the extreme edge of the bank and must be left to starboard when a vessel is going up the bay. The following are the bearings and distances to adjacent objects:

East Brother Light and Fog-whistle	S. 19° W.	¾ mile.
The fifteen-feet rock off the Brothers	S. 35° W.	⅝ mile.

EAST BROTHER LIGHT-HOUSE.

"The Brothers" are two barren, rocky islets, each about one hundred yards in extent and twenty-five feet above the water, lying off the west side of Point San Pablo in the comparatively wide strait connecting San Pablo Bay with the bay of San Francisco, the inner one not quite a quarter of a mile from shore and the outer islet two hundred yards farther out. There is a rocky

* Point San Pablo is called Punta de San Antonio by Sarachef.

† San Pablo Bay is called Round Bay or Guadalupe on an old Spanish chart.

channel with thirteen feet of water between the two islets, and between the eastern islet and Point San Pablo there is a deep channel with ten to fifteen fathoms of water, with strong currents. This channel is used by the bay and river steamers.

On the eastern or inner islet is built the Light-house, which is a square tower thirty-seven and a half feet above the base, rising from a white dwelling with green window-blinds. The lantern is black. The illumination is of the fourth order of the system of Fresnel, and was first exhibited in 1874. It shows a *fixed white light* from sunset to sunrise. The height of the focal plane is sixty two and a half feet above the mean level of the bay. It illuminates the whole horizon, and in clear weather should be visible at a distance of thirteen or fourteen miles. It is therefore distinctly visible to vessels leaving San Francisco, the Oakland piers, or San Pablo Bay.

The geographical position of the Light, as determined by the Coast and Geodetic Survey, is:

Latitude	37°	57′	42″ north.
Longitude	122°	26′	01″ west.
Or, in time	8h	09m	44s.1.

The magnetic variation in January, 1885, was 16° 40′ east, with a yearly increase of 0′.3.

From the Light the bearings and distances to adjacent objects are as follows:

Point Penole	N. 30½°	E.	4⅓ miles.
Wharf at Point San Quentin	S. 11°	W.	2⅝ miles.
Northwest point of Red Rock	S. 18½°	E.	2 miles.
Western edge of Castro Rocks	S. 36°	E.	2 miles.
North buoy of Southampton Shoal	S. 31°	E.	3½ miles.
Quarry Point and Point Blunt, on Angel Island	S. 24°	E.	3¼ and 3⅝ miles.
The Sisters, off Point San Pedro	N. 30°	W.	1½ miles.

EAST BROTHER FOG-WHISTLE.

A twelve-inch steam fog-whistle has been placed in a white building on the eastern edge of the islet fifty yards from the Light-house. During thick and foggy weather, night or day, it gives *alternate blasts* of *eight seconds* and of *four seconds*, with *intervals* of *twenty-four seconds*. Until steam can be raised at the beginning of a fog, or if the fog-signal apparatus is disabled, a bell is struck by hand at intervals of about fifteen seconds.

POINT PENOLE BUOY.

Point Penole lies four and one-third miles north thirty and a half degrees east (N. 30½° E.) from the East Brother Light-house. It is a moderately high rocky bluff, projecting well into the bay, with extensive flats lying northeast and southwest of it. The three-fathom line lies about three-eighths of a mile off the point, and the deepest water in the channel northwest from the point, twenty-nine feet, is at a distance of one and one-eighth miles from it. It must be left on the starboard hand in going to Mare Island.

To make the edge of the flats off this point a *second class nun-buoy* painted *red* and numbered 4 has been placed in twenty-three feet of water half a mile northwest by north (NW. by N.) from the point.

From this buoy the following bearings and distances are given:

Mare Island Light-house	NE. ¼ N.	6⅛ miles.
Penole Point	SE. by S.	½ mile.
East Brother Light-house	SW. by S. ¾ S.	4½ miles.

SAN PABLO BAY—BUOYS.

Black buoy *No.* **1** has been placed two and a half miles north three-eighths west (N. ⅜ W.) from the Light-house on East Brother Island, and two and seven tenths miles southwest by west seven-eighths west (SW. by W. ⅞ W.) from Point Penole.

Red buoy *No.* **3** has been placed one and a half miles northwest by north half north (NW. by N. ½ N.) from Point Penole, and six miles southwest five-eighths west (SW. ⅝ W.) from Mare Island Light-house.

Black buoy *No.* **5** has been placed three miles southwest by west one-eighth west (SW. by W. ⅛ W.) from Mare Island Light-house, and two and four-fifths miles northwest by north (NW. by N.) from Penole Landing.

MARE ISLAND LIGHT-HOUSE.

To aid the navigation of the channel through San Pablo Bay and the entrances to Karquines and Mare Island Straits, a Light-house has been established on the extreme southeastern part of Mare Island. It is on the lower part of the slope, and is projected against the dark hills which rise about two hundred and twenty-five feet above it to the northwestward.

The structure is a small, square tower rising from a white dwelling. The dome of the lantern is painted black. The illumination is of the fourth order of the system of Fresnel, and the light was first exhibited in 1873. It shows a *fixed white light* from sunset to sunrise. The height of the focal plane is seventy-six feet above the level of the bay, and in clear weather it can be seen at a distance of fourteen miles. The arc of visibility is from northeast round by east and south to west by south (from NE. to W. by S.).

The geographical position of the Light, as determined by the Coast and Geodetic Survey, is:

Latitude	38° 04′ 19″ north.
Longitude	122° 15′ 16″ west.
Or, in time	8h 09m 01s.1.

The magnetic variation was 16° 40′ east in January, 1885, with a yearly increase of 0.3.

From the Light the bearings and distances to adjacent objects are as follows:

Point Penole	S.	38° W.	6⅝ miles.
Point Penole Buoy	SW.	½° S.	6½ miles.
Red and black striped Beacon between Mare Island Strait and Karquines Strait	E.	¼° S.	½ mile.
Benicia Ferry Slip	S.	84° E.	4½ miles.
This line tangents the north shore of Karquines Strait at			1¼ miles.
And the south shore (now built over) of Karquines Strait at			3½ miles.
Point at Ferry Slip on the south shore of Karquines Strait	S.	45° E.	1.1 miles.

BEACON ON THE SHOAL AT JUNCTION OF MARE ISLAND STRAIT WITH KARQUINES STRAIT.

A shoal makes out for one-third of a mile to the southwest from the high cliffs at the eastern side of the entrance to Mare Island Strait. To mark the extremity of this spit a *pile beacon, crowned with a box painted with red and black horizontal stripes*, has been placed in twenty feet of water over soft bottom. It must be left on the starboard hand when a vessel is going into Mare Island Strait, and on the port hand when she is going into Karquines Strait. From it the following bearings are given:

Magazine Wharf, on west side of entrance to Mare Island Strait	NW.	¼° N.	¼ mile.
Mare Island Light-house	W.	¼° N.	½ mile.
North shore Karquines Strait	E.	¼° S.	⅛ mile.
Ferry Slip, south shore of Karquines Strait	SSE.		⅝ mile.

The Coast Survey chart to 1877 gives the latest information about the depth of water, etc., in the channel of Mare Island Strait.

COMMISSION ROCK BEACON.

Commission Rock is bare at low water and lies in mid-channel of Mare Island Strait three-quarters of a mile from Magazine Wharf, and nearly half-way between it and the Navy-yard dock. There is good water on the western or Navy-yard side of it, where three and a half fathoms may be carried. The channel on the eastern side appears to be shoaling, and there is a long tail to the rock stretching to the east-southeast. Within the three-fathom curve the length of the shoal is one quarter of a mile in a general east-southeast direction, with a width of one hundred and eighty yards across at the beacon. The rock itself is marked by a beacon, and the western edge of the shoal by a buoy.

The *beacon* is a *large and conspicuous cylinder* of boiler-iron, *surmounted by a spindle and reflector*. It is painted with *red and white horizontal stripes;* but care must be taken not to pass between it and the buoy.

From the beacon the following are the bearings and distances to adjacent objects:

Magazine Wharf	S.	41° E.	⅝ mile.
North end of Railroad Wharf	S.	61° E.	½ mile.
Sectional Dock off Navy-yard	N.	61° W.	⅝ mile.
North Vallejo Wharf	NW.	½° W.	⅛ mile.

COMMISSION ROCK BUOY.

About fifty yards southwest from the Commission Rock Beacon a *second-class can buoy, painted red*, has been placed in fifteen feet of water to mark the western edge of the shoal surrounding the rock. It is to be kept on the starboard hand in going up the strait, and on no account must a vessel try to pass between it and the beacon.

From the buoy the following are the bearings and distances to adjacent objects:

Magazine Point	S. 42° E.	⅝ mile.
North end of Railroad Wharf	S. 65° E.	¼ mile.
Sectional Dock off Mare Island Navy-yard	S. 61° W.	⅝ mile.

Tides at Mare Island Navy-yard.—The times of the high tides average about an hour and twenty minutes later than at North Beach, San Francisco; and those of the low tides nearly an hour and forty minutes later.

To obtain the times and heights of the tides for any required date, first obtain from the tide tables of the Coast and Geodetic Survey the times and heights of the same tides at San Francisco, then to the time of high water add one hour and nineteen minutes, and for the height add one and two tenths feet; to the time of low water add one hour and thirty-eight minutes, and for the height add one-tenth of a foot.

SAILING DIRECTIONS FOR THE NORTHERN PART OF SAN FRANCISCO BAY, AND SAN PABLO BAY.

From the anchorage in front of the city of San Francisco when bound to Petaluma Creek, Mare Island Strait, or Karquines Strait, the general course is northwest by north (NW. by N.) to Red Rock, passing three or four hundred yards to the eastward of Blossom Rock Buoy in a mile and a quarter; a mile to the eastward of Alcatraz Island in two miles; and about half a mile or less to the eastward of Angel Island in three and a half miles. Or, if the weather is clear, the range of the western edge of Red Rock on the eastern edge of Point San Pedro (the northwest point of entrance to San Pablo Bay) may be run from the immediate city front until nearly up with Red Rock. The course of this range is north twenty-nine degrees west (N. 29° W.), and it passes just to the eastward of Blossom Rock Buoy and up mid-channel between Southampton Shoal and the shore to the westward. Under Angel Island a sailing vessel will be apt to lose the westerly wind for some time. There is deep water close to its shores. Red Rock* is a prominent object one hundred and sixty-nine feet high and two hundred yards wide east and west; it has deep water close under its western shore, and also a deep channel on its eastern side. It is eight and one-eighth miles from San Francisco. The flood current through the Raccoon Strait will have a tendency to set a vessel towards the Southampton Shoal, which is marked on each end with a buoy. If a vessel follows the range she will pass a scant half-mile from the northwestern end of it, and when abreast of the buoy marking this end the course should be changed to the westward so as to pass Red Rock one-quarter of a mile on the starboard beam. One and three quarters miles northward of Red Rock lies the buoy marking the Invincible Rock, and a little further on the Whiting Rock Buoy and the red buoy marking the fifteen feet rock off the East Brother. These aids to navigation are close together and can be readily made out when a vessel is abreast of Red Rock. Steer so as to leave them about one-quarter of a mile to starboard. When the last of these buoys, the red buoy marking the fifteen-feet rock, is nearly abeam and distant about one-quarter of a mile, and Point San Pablo is well opened to the northward of the East Brother Light, change the course to north-northeast (NNE.) for four and three-quarters miles. This course will pass the Point San Pablo Buoy (red) half a mile to starboard, and "the Sisters," two bare rocks lying off Point San Pedro, three-quarters of a mile to port. If the current be flood, it will run directly through on this course on the second and third quarters with a velocity of one to one and one-quarter knots. If it be ebb, the current will set to the south-southeast on the first and second quarters at the rate of two to two and a half knots; on the last quarter of the ebb the current sets south by east, over the rocks, with a velocity of one and three-quarters knots.

When this north-northeast (NNE.) course has been maintained for four and three-quarters miles, the vessel will be abreast of Point Penole, bearing southeast by east (SE. by E.), distant one and one-eighth miles, Point Penole Buoy bearing east by south half south (E. by S. ½ S.), distant two-thirds of a mile, and Mare Island Light-house bearing northeast three-eighths east NE. ⅜ E.). At this point change the course for Mare Island Light-house and run five miles.

*Called Molate Island by Beechey in 1826.

When one and a half miles from the turning point on this course, the vessel will be in less than four fathoms of water and will continue so for two and a half miles further, when the water again deepens; but if the course is steered closely, she will cross this shoal stretch in the deepest water and have not less than twenty-two feet at the Coast Survey datum-plane.

After running five miles for Mare Island Light house the Karquines Strait opens to the east-northeast, and the town of Benicia begins to open to the northward of the south shore of the strait. If bound for Port Costa or any of the loading places in or beyond Karquines Strait, change the course to east by north half north (E. by N. ½ N.) and continue up through the middle of the strait to place of destination. If bound up to Suisun Bay and beyond, see "Aids to Navigation and Sailing Directions" further on, pages 243–246.

But if bound up Mare Island Strait, change your course at this point to northeast by east half east (NE. by E. ½ E.), which is for the red and black beacon at the end of the spit between Mare Island Strait and Karquines Strait. When within five hundred yards of this beacon, change the course to north half west (N. ½ W.) (sharply if with the flood, but with easy helm if the current is running out) for the southern end of the wharves on the east side of Mare Island Strait. Continue this course until Mare Island Light-house is just shut in and bearing about southwest, when the western side of the strait, with its wharves and docks, will be in full view and the spindle and buoy marking Commission Rock will be seen. The course from this point up the Strait to the westward of Commission Rock is northwest half west (NW. ½ W.) to the anchorage off the Navy yard. A vessel can carry over four fathoms in the Mare Island Strait, but at low water, vessels over eighteen feet draught should follow these directions closely.

Petaluma Creek* empties into San Pablo Bay at the northwest extremity thereof, and the channel leading to it across the extensive flats of this bay is well marked with pile-beacons. The general course to the first of these beacons, from a position half a mile east of the Sisters off Point San Pedro, is north by west one-quarter west (N. by W. ¼ W.) and the distance five miles; but as no deep-water vessels load or discharge there, no sailing directions will be given in this work. The buoy list, issued every year by the Light house Board and furnished free of charge to any ship-master upon application at the office of the Inspector of the Twelfth Light-house District at San Francisco, gives a description of all the aids to navigation and condensed sailing directions for this and all the minor creeks and sloughs emptying into San Francisco Bay and its subdivisions.

KARQUINES STRAIT.†

There is a large depth of water through this strait, averaging about fifteen fathoms, except in the eastern part, where the strait widens out and the soundings decrease to eight and ten fathoms. The only shoal in the strait is a three fathom patch which stretches for half a mile southeastwardly from the great ferry-slip at Benicia towards the eastern part of Martinez. In this broad part of the strait the deep-water channel is towards the southern shore.

For a vessel bound through Karquines Strait the mid-channel course will carry ten to nineteen fathoms, with high hills on each side and bold water close to the shores. The western part of the strait averages half a mile in width. The general courses through it are: from abreast the black and red beacon on the north side of the entrance, first east half north (E. ½ N.) for two miles; then southeast by east (SE. by E.) for two and a half miles to abreast of Martinez; and thence north east by east (NE. by E.) into Suisun Bay.

The south shore is largely built up with great grain warehouses and docks, ferry-slips, etc., and about three hundred and fifty wheat ships annually load in this vicinity.

SUISUN BAY.

Suisun Bay opens to the northeastward of Karquines Strait. It is a large area of comparatively shoal water, with many flats, marsh islands, and low marshy shores. The main channel to the Sacramento and San Joaquin Rivers keeps close along the southern shore of this bay, the distance being fourteen miles from Karquines Strait. The eastern mouth of this strait is three-quarters of a mile wide between Army Point‡ on the northwest and Bull's Head Point§ (or Simmon Point) on the southeast. Both points are bold and rocky and moderately high. The de-

* An old Spanish chart calls the entrance to this stream the Esdero de las Mercedes.
† An old Spanish chart calls the widest part of this strait the Bay of Assumption.
‡ Called Navy Point by Ringgold in 1850.
§ Called Point Bolitas by Ringgold in 1850.

water between them is eight to twelve fathoms quite close to either point. The bay opens broad to the northeast, with a large area of water and of low, marshy islands, with low hills in the distance. The western shore runs to the north-northeast, with low, marshy land and hills behind; the southern shore runs generally east-northeast, with moderately low, hilly points, bordered and connected by marshy lands.

Important changes are reported in some of the channels through Suisun Bay, but the following descriptions of the aids to navigation and sailing directions are founded on the latest authority.

Preceding these aids we mention the *tides at Army Point*, at the entrance to the bay. The times of the high and low tides average about two hours later than at North Beach, San Francisco. To obtain the times and heights of the tides for any required date, first obtain from the tide-tables of the Coast and Geodetic Survey the times and heights of the same tides at San Francisco, then to the time of the high water add two hours and five minutes, and to the height add one and two-tenths; to the time of the low water add two hours and twenty-two minutes, and the height will be the same as given in the table.

AIDS TO THE NAVIGATION OF SUISUN BAY.

A *third-class nun buoy, with red and black horizontal stripes*, has been placed in nineteen feet of water over muddy bottom at the southeastern tail of the first shoal made in entering Suisun Bay from Karquines Strait.* Army Point lies one and three-quarters miles south fifty-six degrees west (S. 56° W.) from it; Bull's Head Point (or Suisun Point), one and five-eighths miles south twenty-eight degrees west (S. 28° W.); and Point Edith, one and one-quarter miles north seventy-five degrees east (N. 75° E.). Point Edith is the first low and marshy point on the bay shore to the eastward.

The channel for the Sacramento and San Joaquin Rivers is here one-third of a mile wide, and this buoy must be left on the port side when going up towards the Sacramento River. It is also the turning buoy for Suisun Creek and Montezuma Creek, and must be left on the starboard hand by vessels bound northward for either of the latter creeks.

Suisun Creek.—A *third-class spar-buoy*, with *red* and *black horizontal stripes*, has been placed in nine feet of water over soft bottom on the tail end of the shoal making out from the broad side of Joice's Island which lies between Suisun Creek on the westward and Montezuma Creek on the eastward. It must be left on the starboard hand by vessels going into Suisun Creek, and on the port hand by vessels going into Montezuma Creek. It lies five and one-third miles from Army Point following the bay shore-line on the west. Following the western shore from Army Point at the distance of half a mile, the depth of water will be eighteen feet to within five-eighths of a mile of this buoy.

Sacramento Channel, Buoy No. 1.—A *first-class spar-buoy painted black* and *numbered* 1, has been placed in nineteen feet of water over hard, sandy bottom very near Point Edith. The channel is here very narrow, and the buoy must be left on the port hand in going up the bay.

Point Edith lies one-quarter of a mile south forty-five degrees west (S. 45° W.) from it; the south point of Seal Island on the north side of the channel five-eighths of a mile north eighty-eight degrees east (N. 88° E.); and the west end of Roe Island on the north side of the channel one and one-quarter miles north twenty-seven degrees east (N. 27° E.). The highest part of Bull's Head Point is just over the extremity of Point Edith.

Sacramento Channel, Buoy No. 3.—A *first-class spar-buoy painted black* and *numbered* 3, has been placed in twenty feet of water over soft, sticky bottom abreast the northeast part of Seal Island. It must be left on the port hand in going up the bay. The southwest end of Seal Island on the south side of the channel lies half a mile south nine degrees east (S. 9° E.) from it; the northeast end of Seal Island a little over a quarter of a mile south seventy-eight degrees east (S. 78° E.); and the west end of Roe Island on the north side of the channel a little over half a mile north seven degrees east (N. 7° E.). Buoy No. 1 and Point Edith are in range with the highest part of Bull's Head Point.

Roe Island, Buoy No. 4.—A *first-class spar-buoy, painted red* and *numbered* 4, has been placed in twenty-one feet over hard, sandy bottom, almost midway between the middle of Roe Island on the north and the low, marshy shore of the bay on the south. It must be left on the starboard hand when going up the bay.

* This was named the "Lower Middle Ground" by Ringgold in 1850, and the name might well be retained.

The western point of Roe Island lies three-quarters of a mile north seventy-four degrees west (N. 74° W.); the eastern or Gillespie's point of Roe Island a little over three-quarters of a mile north forty-five degrees east (N. 45° E.), and a small house on fast land abreast the north end of Seal Island half a mile south ten degrees west (S. 10° W.).

Middle Point Beacon, South Shore.—A *single pile beacon, crossed with boards* and *painted white*, has been placed in six feet of water in soft, sticky bottom close to the low, marshy shore at Middle Point, off which lies the extensive "Middle Ground," bare at low water for more than a mile. The channel abreast this beacon is not over an eighth of a mile wide between the three-fathom curves. By the channel, Middle Point is four miles distant from Point Edith and six and two-thirds miles from Karquines Strait.

Middle Ground Buoy, South Shore.—This large shoal, bare for more than a mile at low water, lies broad off Middle Point, with its eastern end nearly a mile to the east-northeast. The upper or eastern tail of this bank has been marked by a *first-class spar-buoy, painted* with *red* and *black horizontal stripes*. It lies in twenty-one feet of water over soft bottom. There is a channel to the north and another to the south of it. The present most-used channel is between it and the low, marshy shore five-eighths of a mile to the south.

From this buoy Middle Point Beacon lies one and one-quarter miles south sixty-five degrees west (S. 65° W.); Stake Point, on the low, marshy south shore, nearly one mile south eighty degrees east (S. 80° E.), and Honker Bay Beacon, No. 5, three-eighths of a mile north thirty-one degrees east (N. 31° E.).

Honker Bay Beacon No. 5.—A *pile beacon, crowned with a box, painted black*, and *numbered* 5, has been placed in ten feet of water on the north side of the channel that lies on the north side of the Middle Ground. It is on the outer edge of the extensive flats of Honker Bay, and about half way between Simmons Point and Snag Point. It must be left on the port hand going up to the Sacramento River by the north channel.

From it Simmons Point Beacon lies nearly one and a half miles south eighty degrees east (S. 80° E.); Snag Point nearly one mile north seventy-three degrees west (N. 73° W.), and Middle Ground Buoy three-eighths of a mile south thirty-one degrees west (S. 31° W.).

South Shore, Stake Point Beacon.—On the edge of the low, marshy shore of the south side of the bay a *single pile beacon, crossed with boards* and *painted white*, has been placed in six feet of water over soft, sticky bottom. There is deep water close outside of it.

From it Middle Point Beacon lies two miles south eighty-one degrees west (S. 81° W.); Beacon No. 5, in Honker Bay, seven-eighths of a mile north fifty-five degrees west (N. 55° W.); Simmons' Point Beacon three-quarters of a mile north sixty-eight degrees east (N. 68° E.); and Middle Ground Buoy one mile north eighty-one degrees west (N. 81° W.).

The main and only ship channel in this part of the bay is between this beacon and Simmons' Point Beacon.

Chipp's Island, Simmons' Point Beacon.—Simmons' Point is the westernmost point of Chipp's Island, on the north side of the ship-channel. A *pile beacon, crossed with boards* and *painted white*, has been placed in six feet of water, over soft, sticky bottom, close to the point, with deep water outside.

From it Stake Point Beacon lies three-quarters of a mile south sixty-eight degrees west (S. 68° W.); Middle Ground Buoy one and five-eighths miles south eighty-five degrees west (S. 85° W.); and Beacon No. 5, off Honker Bay, one and one-half miles north eighty-one degrees west (N. 81° W.).

Beacon No. 8, Entrance to San Joaquin River.—Midway between the opposite, low, marshy shores of Van Sickles Island on the northwest and Ruckels* Island on the southeast there has been placed, in nine feet of water, a *pile beacon crowned with a box painted red* and *numbered* 8. It is on the northwest edge of the shoal making out from the northwest point of the entrance to the San Joaquin River and is at the turning point into the river. It must be left on the starboard hand when entering that river.

From it the wharf at Collinsville at the mouth of the Sacramento River lies one mile [illegible] eighteen degrees east (N. 18° E.); the eastern tangent to the small islet named Chain Island [illegible] quarters of a mile north thirty-two degrees east (N. 32° E.); the north end of Ruckels I[illegible], forming the northwest point of the entrance to San Joaquin River, one-quarter of a mile south eighty degrees east (S. 80° E.); and Beacon No. 10, one-quarter of a mile north sixty-five degrees east (N. 65° E.).

* Named by Ringgold, 1850.

Beacon No. **10**, *San Joaquin River Middle Ground.*—The river at its mouth, between the low, marshy banks, is half a mile wide, and expands slightly for a mile inside. An extensive middle ground has been formed just inside the entrance, having as little as three feet of water upon it. The main channel runs on the eastern side of this middle ground under the eastern shore. To mark the northwest tail of this middle ground a *pile beacon crowned with a box, painted red* and *numbered* **10**, has been placed in four feet of water. It may be passed on either hand by giving it a good berth.

From this beacon the wharf at Collinsville lies nearly three-quarters of a mile north nineteen degrees west (N. 19° W.), and that line passes over the middle of Chain Islet; the northwest point of the entrance to the river (Ruckels Island) a little over one-quarter of a mile south fifty-two degrees west (S. 52° W.); the Red Buoy on the tail of Tongue Shoal half a mile south seventy-nine degrees west (S. 79° W.); Beacon No. 8, three-quarters of a mile south sixty-five degrees west (S. 65° W.); and the northeast point of the river entrance (Sherman Island) half a mile north twenty-two degrees east (N. 22° E.).

Tongue Shoal Buoy.—Tongue Shoal lies between the mouths of the San Joaquin and Sacramento Rivers, and forms a tail one mile long, stretching out from the western end of Sherman Island. The main channel of the Sacramento sweeps westward under the main shore to the north, past Montezuma Island and Collinsville, and then turns southward close under the east shore of Van Sickles Island. At this turn, the channel is very narrow, and the tail end of Tongue Shoal lies close to the island. To mark the entrance to this narrow channel there has been placed on the end of the shoal, in twenty feet of water, a *first class spar buoy painted red.*

It lies less than two hundred yards from the marshy shore of the island. From it the wharf at Collinsville lies nearly one mile north thirty-two degrees east (N. 32° E.); the northwest point of the mouth of San Joaquin River (Ruckels Island) half a mile south eighty-five degrees east (S. 85° E.); Beacon No. 8 one quarter of a mile south sixty-four degrees east (S. 64° E.); and Beacon No. 10 three-quarters of a mile north seventy-nine degrees east (N. 79° E.).

SAILING DIRECTIONS FOR SUISUN BAY.

These must be taken in connection with the latest edition of the Coast Survey chart of Suisun Bay, with the understanding that the buoys and beacons are changed by the Light-house Board to give the latest line of the best channel.

From the middle of the eastern entrance to Karquines Strait, between Army Point and Bull's Head Point, steer northeast one-third east (NE. ⅓ E.) for one and five-eighths miles, carrying from seven to three and a half fathoms of water, to the first-class spar-buoy with red and black horizontal stripes which marks the southeastern extremity of the Lower Middle Ground. Keep just to the southward of this buoy, and when up to it change the course to east-northeast (ENE.) for one and three-eighths miles, carrying three and three-quarters to five fathoms of water, to black Spar buoy No. 1, which lies on the north side of the channel and one-third of a mile northeast from Point Edith. The eastern entrance to the old channel, between the low, marshy Seal Island and the equally low and marshy south shore of the bay, has shoaled and almost closed up. Therefore from Buoy No. 1 steer northeast one-eighth east (NE. ⅛ E.) for three-quarters of a mile to black Spar-buoy No. 3, carrying from three and a half fathoms to sixteen feet of water at low tide. Leave Buoy No. 3 on your port hand and change course to northeast by east half east (NE. by E. ½ E.) for red Spar-buoy No. 4, distant seven eighths of a mile, carrying from three and three-quarters to eight fathoms of water. With this buoy on your starboard, continue past it about one-third of a mile, then change the course to east one-quarter south (E. ¼ S.) for one and seven-eighths miles to the beacon at Middle Point on the south shore, carrying from seventeen feet to eight fathoms of water very close off the point. Continue past this beacon on the same course for three-eighths of a mile, and then change the course to east-northeast (ENE.) for one and three-eighths miles (passing one-quarter of a mile to starboard of the red and black spar-buoy marking the eastern extremity of the Middle Ground at seven-eighths of a mile), when the beacon at Stake Point, on the south side of the channel, will bear southeast by east one-third east (SE. by E. ⅓ E.) nearly half a mile distant. The channel is now well defined by the banks, which are half a mile apart, with from four to seven fathoms of water between them.

From the last position, west northwest of Stake Point Beacon, steer through mid channel on a course east half south (E. ½ S.) for one and one-quarter miles, carrying from five to eight fathoms of water, and passing Simmons' Point Beacon on the port hand. When one eighth of a mile past

Simmons' Point Beacon steer east seven-eighths north (E. ⅞ N.) for one and three-quarters miles, carrying from seven to four and one-quarter fathoms of water, until nearly up with the fast land on the south shore just west of Cornwall Landing. If bound to the Sacramento or San Joaquin Rivers, change the course to northeast one-quarter north (NE. ¼ N.) for one and seven-eighths miles to Beacon No. 8 (red), carrying from six to ten fathoms of water. The deep water of the main channel is under the northwest shore, which is low and marshy, and Beacon No. 8 stands nearly midway between the northwest and southeast banks.

If bound to the Sacramento River, and being nearly up to Beacon No. 8, haul sharply under the northwest bank and pass between it and the red spar-buoy on the southern tail of Tongue Shoal, with a passage-way of two hundred yards and five fathoms of water.

If bound to the San Joaquin River, pass Beacon No. 8 on the starboard hand, steering northeast by east two-thirds east (NE. by E. ⅔ E.) for five-eighths of a mile to Beacon No. 10 (red), passing it on starboard hand, and haul under the eastern shore within one-quarter of a mile.

If bound into Cornwall Landing, when at a position in mid-channel one and three-quarters miles east from Simmons' Point Beacon, keep on three-quarters of a mile towards Beacon No. 8 until the town and wharf are opened out to the eastward of the fast land with the slough to the south-southeast, and when the wharf is nearly in line steer for it.

If a vessel be bound up Suisun Creek or Montezuma Slough, in the northwest part of Suisun Bay, keep under the western shore of the bay after passing Army Point, carrying a good broad channel, one-half to three quarters of a mile wide, with sixteen feet to five fathoms of water for five and a half miles to a beacon placed between the entrance to Suisun Creek on the west and Montezuma Slough on the east side of it.

Tides at the mouth of the Sacramento River.—At Collinsville the times of the high tides average nearly three hours later than at North Beach, San Francisco; and those of the low waters nearly four hours later. To obtain the times and heights of the tides for any required date, first obtain from the tide-tables of the Coast and Geodetic Survey the times and heights of the same tides at San Francisco, then to the time of high water add two hours and fifty-one minutes, and add one-tenth of a foot for the height; to the time of low water add three hours and fifty-four minutes, and subtract five-tenths of a foot from the given height.

The high tides at Sacramento City are four hours and forty-seven minutes later than at Collinsville, and the low tides six hours and six minutes.

OAKLAND HARBOR.

On the eastern shore of the Bay of San Francisco, and nearly one mile southeastward of the outer end of the Oakland railroad pier, abreast Yerba Buena Island, are the outer ends of the "training-walls" or jetties of a deep-water entrance into Oakland or San Antonio Creek. The is well marked by the large depot of the narrow-gauge railroad. This building and the railway pier hence to the shore line lie on the south side of the training-walls.

The walls or jetties are about two hundred and fifty yards apart, with a general direction east and west. The channel-way between them is dredged to the depth of fourteen feet, with a width of three hundred feet, and lies midway between the low, rocky jetties. There is a beacon on the extremity of the north jetty, and another midway to the shore. These have lights upon them at night.

The mouth of the channel is one and a half miles nearly east from Yerba Buena Island Light; and the distance to the general shore-line is one and five-eighths miles; here the artificial walls end. Inside the mouth the creek has low, marshy shores, with here and there artificial constructions of wharves and ferry-slips, and the distance between the banks is somewhat wider than between the training walls. One mile inside the mouth of the creek it is crossed by two railroad bridges furnished with draws so that vessels may pass through to the wider basin to the eastward. Beginning at a point seventy yards to the westward of the first bridge, the south side of the dredged channel-way is marked by a line of five *red spar-buoys*, thirty feet in length, and placed in fourteen feet of water at the steep-to slope towards the southern shore. These buoys lie seventy yards apart.

Many deep-laden lumber and coal schooners discharge at the wharves in this creek, and a great number of unemployed coasting steamers and sailing vessels lie here for winter protection both above and below the railroad bridges.

It is used regularly by two lines of large ferry and freight steam-boats plying between Oakland and San Francisco.

QUARANTINE STATION, SAN FRANCISCO.

Commissioners appointed by the United States have reported in favor of locating the Government quarantine station at Horse Shoe Cove, on the northwest side of Angel Island, upon the south side of Raccoon Strait.

NATIONAL QUARANTINE REGULATIONS.

The Surgeon-General of the United States Marine Hospital Service has issued the following regulations, which must be observed at all National quarantine stations:

1. When a vessel arrives at a National quarantine station from an infected port and requires disinfection, she will be subjected to ordinary disinfection, as provided in former regulations.

2. When any vessels hall arrive at a National quarantine station in such a foul condition as to render her dangerous from a sanitary point of view, and is found to require cleansing and disinfection, having at any former time within one year been subjected to ordinary disinfection, such vessel will be required to undergo extraordinary disinfection, which, in addition to the ordinary measures, will include holy-stoning, scraping, the taking out of rotten wood, a second disinfection, and interior repainting, all of which will be required before granting a certificate of free pratique.

THE DISCOVERY OF THE BAY OF SAN FRANCISCO.

Neither Cabrillo nor his successor saw the coast in the vicinity of the Gulf of the Farallones. On the 12th of November, 1542, Cabrillo encountered a great southwest storm off Carmel Bay and had to run before it, seeing no land beyond Cabo de Nieve (behind Point Año Nuevo) until he was off Point of Pines, at Fort Ross. He lost sight of his consort, noted the change of trend at Point Arena, and reported the coast mountains covered with snow. He returned southward, and, rounding Point Reyes, sought for anchorage and protection in the "Grand Gulf" under that headland; but the weather was bad, and, anchoring in forty-five fathoms of water, he took possession of the country and called this broad bight the Bay of Pines. He does not mention Point Reyes except as a turning of the shore-line, nor the Farallones; and very certainly did not see the entrance to San Francisco Bay.

In the two subsequent passages of Ferrelo, the successor of Cabrillo, he was driven off the coast in this vicinity by bad weather.

The bay was not entered by Sir Francis Drake who anchored under Point Reyes in June and July, 1579.

The Bay of San Francisco was not known to Vizcaino who entered La Puerto de San Francisco in January, 1603, but this harbor was under Point Reyes where the *San Augustine* was supposed to have been lost in 1595 at the harbor of San Francisco.

It was not known to Don José Cabrera Bueno Gonzales, who published a Coast Pilot of this coast in 1734.

A land discovery of the Bay was made in 1769 by Gaspar de Portala, Governor of California, who left San Diego to establish a Jesuit mission at Monterey. Although they passed Point Pinos and traveled along the shores of Monterey Bay, they failed to recognize Vizcaino's description of a "famous harbor, protected from all winds," and continued northward as far as Pillar Point. From the mountains to the north and overlooking Half Moon Bay a reconnoitering party saw an immense inland sea. They also saw Point Reyes and the "Farallones at the port of San Francisco," and endeavored to reach Point Reyes, but were hindered by a great arm of the sea, which was really the Golden Gate and Bay of San Francisco, November 2, 1769.

A letter from the Marquis de Croix to Don Pedro Fagus, Governor, etc., dated Mexico, November 12, 1770, after referring to the expedition of Don Gaspar de Portala, Ex-Governor, etc., complains of the want of any news of the finding of the Bay of San Francisco, which he describes as in latitude 38° 30′.

In August, 1774, Don Juan Perez, in the *Santiago*, upon his return southward made the North Farallones, which lie to the southwest of Point Reyes, and five leagues from the port of San Francisco. When the islets were seen, at the distance of one league, "the course was changed to southwest in order to leave them to leeward, not knowing whether there was a good passage between them and the shore." They afterwards saw the Southeast Farallon, but the weather was too thick to see the shore. (Father Junipero Serra's narrative.)

On the 16th of March, 1775, the mail-boat *San Carlos*, under command of Don Manuel Manrique, left San Blas (in company with the *Santiago* and *Sonora*) with orders for the reconnaissance of the port of San Francisco that was seen by Portala's expedition. In June, under command of Don Juan de Ayala, who had superseded Manrique, she left Monterey and entered the great inland sea through the Golden Gate, and is the first vessel that did so.

In the same year the second Spanish expedition for the exploration of the northern coast of California approached the bar of San Francisco, and the schooner *Sonora*, under command of Heceta, lay off the entrance. On the 5th of October, at 5 p. m.—

After passing Point Reyes we arrived in the neighborhood of some islets,* which in the chart are placed in the mouth of the San Francisco, for which reason we passed between them, going along the land as close as possible in order to take observations of the mouth of San Francisco, and actually, after sailing into the entrance of old San Francisco, came in sight, at 6 p. m., of the new port, but where no disembarkation was made on account of being short-handed and the want of a canoe.

We remained becalmed until the 6th and left for Monterey.

In the entrance to the port of San Francisco we found soundings from the Farallones from twenty-seven to twelve fathoms in sand and mud. At noon the latitude was 37° 43′.

This expedition discovered Bodega Bay, and the mate of the schooner added to the existing confusion by confounding Bodega Bay with Sir Francis Drake's. He says:

The port of Sir Francis Drake has been erroneously called San Francisco. * * * That of Francis Drake is doubtless Bodega Bay, and that of San Francisco is to the southeast of Point Reyes, a very short distance from the same, from whence run the Farallones to the south-southwest. * * * The San Francisco port of to-day (October, 1775) is eight leagues to the east of Point Reyes, and is not easily discovered unless it is entered some distance within its mouth.

The first accurate latitude of San Francisco Bay was given by Don Juan Francisco de la Bodega y Quadra in the third exploration of 1779. Returning from the north the *Favorita* entered the bay on the 14th of September and anchored off the Presidio in ten fathoms; the *Princessa* entered on the 15th and anchored near by in fifteen fathoms. They placed the bay in latitude 37° 50′.

Dalrymple, in his collection of charts, published in 1789, gives a "plan of Port San Francisco" from a Spanish manuscript. This is singularly erroneous and without scale. It places Punta de Reyes in latitude 37° 19′ north, and the trend of the coast thence to the Golden Gate is laid down true east. Anchorage under the Farallones in thirty-one fathoms, mud.

Vancouver visited the bay in 1792 and 1793, and gives a good general map of the entrance. The Presidio of San Francisco was then occupied by Spanish troops, and he was not permitted to survey or make any examination of the bay and its approaches.

In 1824 Kotzebue examined the bay, and the astronomer of his vessel determined the latitude of the harbor 37° 48′ 18.″2 north and the longitude 8^{h} 09^{m} 39^{s}.6 west. Both determinations are remarkably close to the truth.

The first accurate hydrographic survey was made by Capt. Fred. W. Beechey, in the *Blossom*, in November, 1826, he carrying his work to the Strait of Karquines.

In October, 1837, Capt. Sir Edward Belcher ascended the Sacramento with the boats of the *Sulphur*, and starting from the "Fork" carried the survey down the river to connect with Beechey's survey. The "Fork" he calls Point Victoria, and places in latitude 38° 46′ 47″ and 0^{h} 47^{m} 31^{s} east of the observatory on Yerba Buena. This point is formed by the confluence of the Rio de las Plumas, or Feather River, with the Sacramento River about twenty miles above Sacramento City. The river but a short distance above his starting point was fordable, and thence to its mouth traversed in its meanderings one hundred and fifty miles.

The head of steam-boat navigation is at Red Bluffs, in latitude 40° 10′.

The Coast and Geodetic Survey charts furnish all that can be desired in regard to the lower part of the Bay of San Francisco and adjacent waters up to and including the mouths of the Sacramento and San Joaquin Rivers.

FROM POINT REYES TO TOMALES POINT.

Northward of Point Reyes we find a long reach of broad, white sand beach, backed by sand dunes, and extending in a north one-third east (N. ¼ E.) direction between nine and ten miles; then the shore curves to the northwest and changes to a high, precipitous, rocky coast run-

* Elsewhere, in the same narrative, called the "Islets of San Francisco."

to Point Tomales, which bears north eleven and a half degrees west (N. 11½° W.), distant fourteen and a half miles from the Light-house on Point Reyes. Behind the sand dunes the land is of moderate elevation and treeless, but affords good grazing. Five miles from Point Reyes the land immediately behind the beach is quite low, and in hazy weather vessels will be deceived in estimating their distance therefrom. Two and a half miles northward of Point Reyes, the British ship *Haddingtonshire* went ashore in April, 1885, with all sails set, in foggy weather, and became a total wreck.

Seven and a half miles above Point Reyes is the opening to *Abbott's Lagoon* or Estero, the south point of which is low and sandy, and the north point soon rises to one hundred and forty feet. The channel is thirty yards wide at high water, and bare at low water. At the time of the survey a wreck lay off the south point. The wider and larger arm of the lagoon runs nearly one mile southeastwardly towards the head of the western branch of the Estero de Limantour, and a little more than that distance from it. The other arm runs nearly a mile and a half to the northeastward.

Along this long line of straight shore from Point Reyes we have from a shore station watched the eddy inshore current working to the northward; it sometimes extends several miles from shore.

TOMALES POINT.

The ridge forming Tomales Point and the western shore of Tomales Bay is the northern extremity of the twenty-five-mile mountain ridge starting from Duxbury Point. About four and a quarter miles southeastwardly from the point the ridge is six hundred and seventy-three feet high, with slightly lower ground a few miles south. It is where the sand dunes strike this ridge a little further south that the coast changes its character; thence to the point it has bold and rocky cliffs with breakers about one-third of a mile off the point, and on the prolongation of the ridge, which averages less than three-quarters of a mile in breadth for the last four miles.

Three-quarters of a mile before reaching Tomales Point from the southward, a rocky islet, eighty feet in height, is seen within less than a quarter of a mile from the cliffs and within the three-fathom line of soundings. With this exception there are no outlying dangers off this stretch of coast-line, and no kelp, and the beach is quite steep. The twenty-fathom curve lies at an average distance of one mile off shore, and the ten fathom at half a mile. The thirty-fathom curve is less than three miles off shore, and thence seaward the depth increases ten fathoms about each three and a half miles to seventy fathoms at fifteen or sixteen miles off shore. Beyond that the hydrography is not completed. Along the coast in ten and twenty fathoms the soundings are over a bottom of hard sand and clay; and from thirty fathoms outward the bottom is principally soft green mud sometimes marked by fine, green sand, mica, or broken shells, but the characteristic is the green mud as the depth increases.

Vessels coming from the northwestward in foggy weather, and hauling in to make the land, are sometimes deceived by the soundings and believe themselves south of Point Reyes. But if they are south of Point Reyes the character of the swell changes very perceptibly when they run into thirty fathoms of water. If the lead is used there need be no hesitation about the latitude if the chart is consulted, because ten miles to the northward of Point Reyes the depth decreases from sixty to thirty fathoms in eleven miles on an east course; from sixty to thirty fathoms in six or seven miles off Point Reyes; and from sixty to thirty fathoms in seventeen miles, five miles south of Point Reyes. A vessel north of Point Reyes, running easterly, will change her depth from thirty to twenty fathoms in one mile; south of Point Reyes she will have to run five miles to make the same change. This sudden change so close in shore, northward of Point Reyes, is very characteristic. The northwesterly swell rolls squarely on the beach north of Point Reyes, and a vessel finding herself in twenty fathoms ought to haul out without hesitation or anchor at once. The rote of the surf on the beach can be heard at that distance if the wind is not too strong. (See sailing directions, pages 218, 219, 220 *et seq.*, for vessels bound to San Francisco from the northwest, in foggy and thick weather.)

The geographical position of the trigonometrical station about one hundred yards southeast of the extremity of the bluff at Tomales Point and about eighty feet above the sea was determined by the Coast Survey as follows:

Latitude	38°	14′	15″.4 north.
Longitude	122°	59′	39″.3 west.
Or, in time	8h	11m	58s.6.

The magnetic variation was 16° 50′ east in 1885, and the yearly increase is 0′.5.

The point rises to two hundred feet elevation at one-quarter of a mile to the southward of this station.

From Point Tomales we have the following bearings and distances to prominent objects:

Point Reyes Light-house	S. 11½	E.	14½ miles.
Bodega Head	N. ⅝	W.	4¾ miles.
Point Arena Light-house	N. 58	W.	55 miles.

This point was called Great Bodega Cape by the Russians as late as 1848. On the latest Coast Survey charts it is called Tomales Point.

TOMALES BAY.

The Bay of Tomales extends from Tomales Point south fifty-two degrees east (S. 52° E.) for thirteen miles, with an average width of seven-eighths of a mile, and is, roughly speaking, parallel with the general coast-line. Abreast of the point the breadth is one and a quarter miles, but in the distance of one mile it is contracted to one-quarter of a mile wide at Sand Point, which is a low, sandy point running south from the eastern shore.

In the approaches to this bay the three-fathom line of soundings extends two hundred and fifty yards off the point towards the northwest; and a fourteen-feet shoal, with a patch of kelp, lies five hundred yards off the point to the northwest by north (NW. by N.); beyond this the depth increases to ten fathoms in half a mile. One-third of a mile inside the point is the bar to the entrance to the bay, and across it for about three hundred yards the depth is ten feet in a somewhat contracted channel still further obstructed by sandy lumps of six and seven feet. This channel lies four hundred yards from the eastern bluff of the point, and two-fifths of a mile east by north (E. by N.) from the extreme point. It is exposed to the full force of the northwest swell, and with the least swell from seaward it breaks across the whole entrance. One serious drawback to crossing this bar is the liability of a vessel losing the wind so soon as she gets under the lee of Tomales Point, and then drifting on the shoals, which casualty has frequently happened.

For two or three miles the bay is somewhat contracted in width, but has a narrow and moderately deep channel close under the western shore, where two inner bars, with only ten and sixteen feet, are found at one and a half and four and a quarter miles from the point. Four miles within the entrance, and in the middle of the bay, lies a small islet locally known as Hog Island. The inner bar, having sixteen feet over it, lies half a mile south by east half east (S. by E. ½ E.) from this islet. Thence the general depth of the water increases for nearly four miles, when it shoals to less than eighteen feet and gradually decreases to the head. A vessel that can cross the bar can go within two miles of the head of the bay at low water.

The shores of Tomales Bay and the adjacent country are now thickly settled, and before the building of the narrow-gauge railroad from Russian River to San Francisco, the traffic of this extensive agricultural and stock raising region employed a fleet of small schooners and a small steamer. Now the produce mostly finds its way to San Francisco by rail. The line of the North Pacific Coast Railroad skirts the eastern shore of the bay, and crosses the mouths of the arroyos and esteros on trestle-works.

Tides at Tomales Bay.—Compute the times and heights for San Francisco for the given day, or take them from the published tide-tables for the Pacific Coast, and then for the time of high water at Tomales Bay subtract eight minutes, and for the time of low water add nineteen minutes; for the height of the tide at high water, and also at low water, subtract four tenths of a foot.

The chart of Tomales Bay, published by the U. S. Coast Survey, gives all the information that can be desired for entering the bay, and its relation to the coast is well exhibited on the general chart.

In 1852 the ship *Oxford* mistook the entrance to this small bay for that of San Francisco, and after getting on the rocks outside of Tomales Ridge, was deserted, floated off, drifted into the bay over the bar with flood tide, and, all sails set, grounded on the flats, and at the following high water floated off again; but no one being on board she again drifted on the flats and lay inside of Sand Point for some years.

In February, 1857, while we were on Tomales Point, the waters of the bay changed to a deep brownish-purple color, and the fish died in such great numbers that the beaches and water were covered with them.

This bay was laid down by Vizcaino in 1602 as the Rio Grande de San Sebastian. From the chart it is clear that he thought the broad straight line of the bay between high banks was a great river.

The bay was discovered by Francisco de la Bodega y Quadra on the 3d of October, 1775, when he was looking for the Port of San Francisco. He says that towards the southeast part of Bodega Bay he discovered the mouth of a large river which presented the appearance of a famous harbor. He actually entered the bay believing it to be San Francisco, and waited recognition of the Presidio.

This bay was known as Port Juan Francisco by the Spaniards when Vancouver visited the coast in 1792.

In old Mexican grants it is called Tamales and sometimes Tomales. The old Californians invariably pronounce it like the former. There is no doubt the old Spanish name Tamales was applied to the bay, because the Tamal tribe of Indians inhabited the country hence to San Francisco Bay.

Belcher erroneously designates it as a part of Bodega Bay.

The Russians have a chart of the entrance and name it the Bay of Great Bodega.

Duflôt de Mofras calls it the Estero Americano, which is another body of water emptying into Bodega Bay. He calls Point Tomales Point Bodega.

The topography of the entrance was executed by the Coast Survey in 1853. A map of the whole bay was published in 1861 and in 1863, with editions embracing all aids to navigation to 1878. The general chart embracing it was published in 1885.

BODEGA HEAD.

This point lies north twenty-two degrees west (NNW.) eighteen and one-third miles from Point Reyes Light-house, and forms the northern point of Bodega Bay, reckoning Tomales Point the southern. The treeless head is two hundred and forty feet high, with steep, rocky cliffs on the south and west sides and a slightly rounding grassy summit. The land continues of nearly the same height for one and three-quarters miles northwest, when it changes to a broad sand beach with low country adjacent, but high hills in the background towards the north. This low land along the shore is a series of sand dunes one hundred and twenty feet high, and is cut in ridges parallel to the direction of the summer winds. The face of the country thence begins to change from its uniformly treeless appearance to hills that are partially covered with pine trees.

On account of the large lagoon lying inside Bodega Head, and the narrow and comparatively low neck northward of it for two miles, the head sometimes looms up largely when the higher land inside is partially obscured with haze. It has been frequently held out as a warning not to mistake Bodega Head for Point Reyes, but there exists no reasonable ground for raising a question on this subject, although navigators who have lost or jeopardized vessels offer as an excuse the great similarity of the coast and headlands to those near the Golden Gate. We have never been able to detect it. The highest point of the head is three hundred feet l[illegible]r than Point Reyes, and is comparatively flat, whereas the latter is a serrated ridge three miles long. Moreover, there is no light or fog-whistle at Bodega Head.

One third of a mile southeast from the southeast face of the head lies a small rocky islet called Bodega Rock, for the description of which see under the head of Bodega Bay. The line of this rock and the head, as well as the line of shoaler water in Bodega Bay, clearly indicate that it is a prolongation of the great ridge running from Ballenas Bay to Tomales Point.

The line of ten fathoms is only about half a mile off the southwest flank of Bodega Head, and the thirty fathom line only about one and a half miles from the shore. Thence the depth increases ten fathoms for each three miles to a depth of seventy fathoms. Inside the line of thirty fathoms the lead shows hard sand and rocky bottom. Outside that limit we find the soft green mud with quite regular bottom hence to the latitude of Point Reyes.

The geographical position of the U. S. Coast Survey station on the highest part of the head, half a mile from the southernmost bluff, is:

Latitude	38	18′	20″	north.
Longitude	123	03′	49″	west.
Or, in time	8h	12m	15s.3	

The magnetic variation was 16° 50′ east in 1885, with a present annual increase of half a minute of arc.

The bearings and distances to prominent objects are as follows:

Point Arena Light-house	N. 58° W.	51 miles.
Fort Ross Point	N. 52° W.	15¼ miles.
Tomales Point	S. 55° E.	4¼ miles.
Point Reyes Light-house	S. 22° E.	18½ miles.
Southeast Farallon Light-house	S. 19° E.	36¾ miles.

Off Bodega Head a vessel should be able to see the light on Point Reyes in favorable weather.

Bodega y Quadra called this head the Punta del Cordon (1775).

The Russians called this head the Little Cape Bodega, and also Cape Rumianstof, and placed it in latitude 38° 17′.8, longitude 122° 59′.0.

The Indian name was Tiu Tuiya.

BODEGA BAY.

From Tomales Point to Bodega Head the bearing is north fifty-five degrees west (N. 55° W.) and the distance four and two-thirds miles. The average width of the large indentation in the main coast-line to the eastward of the above line is only one and two-thirds miles, with the shore running a nearly parallel course. This is the Bay of Bodega, with the long, straight, and narrow Tomales Bay entering it at the south and the lagoon of Bodega Port connected with it at the north behind Bodega Head. The shore of the bay is bordered by numerous rocks inside the three-fathom line, and is high, abrupt, and rocky. Within less than a mile inland it reaches a height of five hundred and ninety-four feet. The land is cultivated and treeless. The shore is indented by several small gulches and the openings of two large esteros. On this shore the western swell rolls in constantly, and frequently the mouths of the esteros are closed by the sand and gravel cast up. On the Russian charts they are both marked closed; on the Coast Survey chart they are both open.

These two esteros open directly on the bay, coming from the interior between high, steep, and contracted banks. The northern one is the *Estero del Americano*,* situated two and a half miles north seventy-six degrees east (N. 76° E.) from the southernmost face of Bodega Head; the southern one is the *Estero de San Antonio*, four miles south eighty degrees east (S. 80° E.) from the same point. The former is the boundary line (near the coast) between Marin and Sonoma Counties. In the latter the tide-water reaches over fifteen miles inland, but it is not more than a stone's throw across. The names are interchanged on the earlier editions of the Coast Survey charts. The former has a sand-spit stretching nearly across the mouth from the north side, and the latter has a broad sand-point making out from the inner south point half-way across the mouth.

One quarter of a mile off the shore just south of the Estero Americano lie two rocks on the five-fathom line; and one-quarter of a mile off the shore just north of the Estero de San Antonio lies a rock on the four-fathom line.

The general depth of the water in the bay is eight to ten fathoms over a bottom of hard sand, with a depth of five fathoms not over half a mile from the cliffs. But on the line between Tomales Point and Bodega Head the soundings are irregular, from five and a half to thirteen fathoms over rocky bottom; inside of this line the depths are uniformly ten and eleven fathoms, with four and five fathoms close in shore; one mile outside of this center line the twenty-fathom curve lies nearly parallel with it, and thence the depths increase seaward, as already mentioned in the description of Bodega Head.

The anchorage of Bodega Bay is protected on the north, west, and east, and is open to the south-southeast. The southwest and west swell is partly broken by the low, rocky islet, called *Bodega Rock*,† which lies on the prolongation of the Head nearly one-third of a mile east-southeast (ESE.) from the middle of the southeast face of Bodega Head, and is the only *danger* in the approaches. This rocky patch is much broken up and its highest part, nearer the Head, rises only a few feet above the water; its greatest extent is one sixth of a mile northwest and southeast, and half that in width. From the main part of this rock, broken ground with nine feet of water upon it extends one-third of a mile to the southeast with a sudden dropping into three and five fathoms, and one patch of eighteen feet lies the same distance from the rock to the south by east half east (S. by E. ½ E.), with five and six fathoms close to it, and three and one-quarter inside of it. The reef is densely covered with kelp, and the breakers usually indicate its position.

* The Avatcha River on the Russian charts; the Rio San Ignacio of De Mofras.

† The Indian name is O-mouya-pa-i on the Russian charts.

Bodega Bay.

Tomales Point, N. ¾ E., 15 miles.

Abbott's Lagoon.

Sonoma Mountain.
32 miles, 2,192 feet.

Bodega Head, 240 feet, N. 26° E., 10 miles.

Mount Helena, 4,343 feet, 40 miles.

Walalla Mountain, 2,21[illegible] feet.

Mouth of Walalla River, NE., 5 miles.

Between Bodega Rock and the Head there is a narrow four and a half fathom passage (one eighth of a mile wide between the three-fathom curves) opening directly upon the anchorage. In coming from the northwest in summer this channel is available; but in beating out it is too contracted to be safe. When directly between the Head and the Rock keep closer to the Head than to the Rock.

The anchorage lies between the Head and the mouth of the Estero del Americano, which lies two miles exactly east from Bodega Rock. The best position for anchorage is in four fathoms of water with the southeast face of Bodega Head bearing southwest (SW.), the point of the lagoon spit bearing west by north (W. by N.) and the Bodega Rock bearing south half west (S. ½ W.). In this position the nearest part of the Head and the beach to the northward are equidistant, six-tenths of a mile from the anchorage. The bottom is hard and composed of coarse sand and patches of clay. Small vessels may anchor in three fathoms half-way between the above position and the bar at the mouth of the lagoon, bringing the southeast face of the Head to bear southwest three-quarters south (SW. ¾ S.) and the nearest part of the bluff only one-quarter of a mile distant.

During the heavy northwest weather in summer we have counted sixteen vessels anchored in this bay at one time, and as many as thirty to forty schooners and several steamers have been reported windbound there in one blow. When coming in to the southward of the Bodega Rock be careful not to bring the mouth of the Estero Americano to bear anything to the eastward of northeast by east half east (NE. by E. ½ E.) and run that course until the eastern face of Bodega Head bears northwest by west one quarter west (NW. by W. ¼ W.); this will clear the tail of the reef about one eighth of a mile in six fathoms of water. Thence the course to the anchorage is northwest by north half north (NW. by N. ½ N.) and the distance three quarters of a mile; but sailing vessels will have to make a couple of tacks to reach it.

During the winter season it is necessary to anchor well out to be ready to slip and run, as the sea room is very contracted and the southwest swell heavy. Some vessels have ridden out heavy southeasters, but several have been lost. The Russian vessels, being generally well found in ground tackle, could ride out a gale. In beating out, the only known danger is the Bodega Rock and reef already described.

Fogs are considered more frequent in Bodega Bay than under Point Reyes, as the low land allows the wind to draw very strongly over the coast line.

Bodega Port.—One mile west of the Estero Americano a low, narrow sand-spit, one and a half miles long and covered with bushes behind high-water line, stretches towards Bodega Head and reaches within one hundred yards of it, where a passage exists for the ebb and flow of the waters of the extensive lagoon north of the sand spit. This lagoon has narrow and intricate channels, but is almost destitute of water at low tides. A depth of eight feet can be carried into this lagoon over the bar at low water. The channel increases a few feet in depth for one mile inside, and runs close under the western shore of the lagoon. The depth of water on the bar is subject to changes after heavy southeast weather. The small village of Bodega Port is situated near the extreme eastern part of the lagoon, where small coasters can reach at high water. Before the building of the railroad through this section of the country a very large coasting traffic was done from this place.

The secondary astronomical station of the Coast and Geodetic Survey was upon the western extremity of the sand-spit inclosing the lagoon; its geographical position is:

Latitude	38° 18′ 20″.6 north.
Longitude	123° 03′ 19″ west.
Or, in time	8h 12m 08s. 6.

This sand-point was called the Punta de las Arenas by Bodega y Quadra in 1775. He placed it in latitude 38° 18′ and anchored off it in six fathoms over muddy bottom. He entered this inner roadstead or port, which he says resembles a dock.

The chart of Bodega Bay published in 1864 exhibits the character of the bay and shores; and the relation to the coast is seen in the new issue of the general chart.

The tides at Bodega Bay.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XIh 19m. The average difference between the establishment and the intervals of the a. m. and p. m. tides of the same day is 1h 36m for high water and 0h 40m for low water. When the moon's declination is greatest these quantities become 2h 36m for high water and 0h 48m for low water. The mean rise and fall of the tide is three and seven tenths feet; of spring tides four and four-tenths feet, and of neap tides two and eight-tenths feet. The

average difference in height of the a. m. and p. m. tides of the same day is one and one-tenth feet for high waters and two and one-half feet for low waters. When the moon's declination is greatest these numbers become one and one-half feet for high waters and three and nine-tenths feet for low waters. The average difference in height of the higher high and lower low tides of the same day is five and one-half feet, and when the moon's declination is greatest six and four-tenths feet. The mean duration of the rise of the tide, reckoning from the middle of one stand to the middle of the next, is $6^h\ 18^m$ and the mean duration of the fall is $6^h\ 07^m$.

The highest high tide in the twenty-four hours occurs about $10^h\ 27^m$ after the moon's transit, when the moon's declination is north, and about two hours before the transit when the declination is south. The lowest of the low waters occurs about seven hours after the highest high water.

To find the times and heights of the high and low waters for any required date, first obtain the same for the predicted tides of San Francisco, and then subtract $0^h\ 48^m$ for high water at Bodega, and subtract $0^h\ 29^m$ for low water. The heights are the same as for San Francisco.

The Bodega Wind gap.—On account of the general depression of the hills behind Bodega Bay and to the northward some distance, as well as over Tomales Point and through Tomales Bay, the summer winds from the west-northwest draw in towards the Petaluma Valley with great force. The trunks of the oak trees rise straight for about ten feet, then bend almost at right angles without a branch for about ten or fifteen feet farther; and each terminates in a clump of branches all dragged out by the almost constant action of the wind. Fogs are found drawing in sooner and more frequently than upon any other part of the coast.

The country in the vicinity was formerly very productive both in the valleys and upon the hills, which average about six hundred feet in elevation. But the soil has been overcropped, and the greater part is now used for pasturage. A fine tract of agricultural country stretches behind the coast hills, extending from Petaluma Creek up through the Russian River Valley.

In the position of Bodega Bay, Vizcaino's chart has a great river named the Rio Grande de San Sebastian, but it refers to Tomales Bay.

Bodega Bay was discovered by Bodega in 1775, and placed in latitude 38° 18′ north. It was partially examined by Mr. Puget under Vancouver's direction in 1792.

In 1817 Kotzebue always refers to it as Port Rumiantsoff, and on recent Russian charts it is called the Bay of Count Rumianstof. Kotzebue clearly indicates that the Russians intended to obtain possession of this country, and we have been assured by eminent Russian authority that this was the policy of the Russian governors of Alaska up to the advent of the Americans.

In 1812, by permission of the Spanish governor of California, Bodega Bay was occupied by the Russian-American Company, who afterwards refused to give it up, and retained possession until 1841. They erected two large wooden houses under the eastern bluff, inside the entrance to the lagoon; but these buildings were in ruins at the time of our visit in 1853. The Russian work of Tebenkoff (1848) says:

> The Bay of Bodega (of which the Indian name is Tuliatshvo) was thoroughly surveyed and described in 181 Captain Hagemeister. It is similar to the port of Trinidad in being convenient only during the summer, wh northwest winds blow along the coast; at any other season it is dangerous. Both its indentations within the west and southeast headlands (lagoon of Bodega Port and Tomales Bay) are shallow and contracted, and there it is necessary to anchor in the open roadstead.

In 1839, under Belcher's orders, Kellett commenced the survey of Bodega Bay in the schooner *Starling*, and was soon after joined by the *Sulphur*.

FROM BODEGA HEAD NORTHWARD.

The coast-line between Bodega Head and the northwest cape at Fort Ross curves slightly to the eastward of the line joining the two places. Sand dunes, reaching one hundred to one hundred and forty feet in height, begin one and a half miles from the southern point of Bodega Head and extend two miles to the northward to the mouth of a small stream called *Salmon Creek*. The stream is about one hundred and fifty yards wide at the beach; the southern point is low and sandy and the north side is rocky, and the land begins to rise rapidly, reaching six or seven hundred feet within a mile. The high hills, which had retreated behind the Lagoon of Bodega Port, now come close to the coast-line, and at a mile inland reach one thousand feet elevation. Two and three-quarters miles from Salmon Creek there is a very small jutting cliff, sixty feet high, at which is a dangerous, rocky cove, known as *Duncan's Landing*, where formerly a considerable traffic was done in lumber, etc., which was brought by rail from Duncan's Mills on the Rus-

River and loaded here on small coasting vessels. Two heavy buoys were laid for vessels to haul out to. The trade is now done by the railroad. The coast-line from Salmon Creek consists of high cliffs, broken by gulches and bordered by innumerable rocks, none of which, however, extend over one-quarter of a mile from shore.

Russian River.—From Duncan's Landing the coast-line continues in a nearly straight line of high, broken cliffs, cut by gulches from the hills, for three and two-thirds miles to the mouth of Russian River, which lies nine and a half miles north forty-one degrees west (N. 41° W.) from Bodega Head. The shore is bordered by rocks from twenty to one hundred and thirty feet high. One and one-quarter miles southeast from the river is a rock one hundred yards in extent, one hundred and seven feet high, and about one-quarter of a mile off shore. It was known by the Russians as *Gull Rock*. Half a mile northwest of this lies another rock nearly twice as large, but only eighty five feet high, flat topped, and four hundred yards off shore. This rock is perforated, and is the largest *Arched rock* on this part of the coast. The sharp point of rocky cliff between these rocks is the *Cape Slavianska* of the Russian charts. In three hundred yards this point rises to a bare peaked hill, three hundred and seventy-three feet high, and has slightly lower land behind it hence to the river. Three quarters of a mile west-northwest of it is a bare hill, four hundred feet high, half a mile inside of *Channel Rock*, which lies less than half a mile south of the mouth of the river, and is a bold, flat-topped islet, one hundred and twenty eight feet high, and two hundred and fifty yards in extent, which is connected with the bluff shore by a reef of rocks.

The mouth of the river between the high cliff banks is about half a mile wide, and the stream is a full and rushing body of water in the rainy season. But during the summer months, a dry bar of sand and gravel forms completely across the mouth, so that land travel along the coast then passes over it. It requires the heavy rains of the fall and winter months to sweep away this barrier, which, however, forms again after a few weeks of dry weather. The river takes its rise at the head of Russian River Valley, eastward of the immediate parallel coast ranges; and during the summer the bed of the river is dry above Healdsburg, thirty miles from its mouth, and can be forded at several places in that distance. Before breaking through the coast hills it comes through a broad, fertile valley; but when near the coast the hills rise to two thousand feet, and the channel is deep and rocky. The valleys of the arroyos and streams tributary to the Russian River near the coast were filled with a very dense growth of heavy redwood, which has been greatly depleted and transported hence by rail to San Francisco. At one of the Coast Survey mountain stations (Walalla) over forty trees were cut down that measured from five and a half feet in diameter (spruce) to eight and a half feet (redwood).

The geographical position of Channel Rock, marking the mouth of Russian River, is:

Latitude	38°	26′	16″	north.
Longitude	123°	07′	40″	west.

And from it we have the following bearings and distances to prominent points:

Bodega Head	S. 38° E.	8¾	miles.
Point Reyes Light-house	S. 28° E.	27	miles.
Fort Ross	N. 71° W.	7¼	miles.

Russian River was named the Slavianka by the Russians, and continued so on their charts to 1848 (Tebenkoff). Duflôt de Mofras (1841) calls it the San Sebastian.

Rules Landing.—This landing was located in 1877, but has since been abandoned. It lies one and a half miles northwest from the mouth of Russian River, under a high head, two hundred and twenty yards long, north-northwest and south-southeast, and one hundred and twenty yards wide, with a narrow neck connecting the northeast side with the main bluff, which is one hundred and forty feet high. A small cove, one hundred and fifty by one hundred and thirty yards in extent, is thus formed, which has a depth of twelve feet of water. From the south end of this head, which we have named Rules Head, a line of small, low rocks stretches south nearly five hundred yards. Bird Rock, fifty-five feet high and forty by fifteen yards in extent, lies nearly two hundred yards west of the tail of this line, and the whole of them serve to break the full force of the northwest swell in the cove. Three hundred yards east of the outer end of these rocks lies a rock half-way to the shore, and between this single rock and the line of rocks is the approach to the landing. A sunken rock with four feet of water upon it is reported close in about one hundred and fifty yards southeast from the Head; and a very heavy breaker on a seven-foot rock, with eleven fathoms around it, lies six hundred and fifty yards south by east

(S. by E.) from the Head, about where the soundings give four and three-quarters fathoms. This danger is one mile and one hundred yards north forty-six degrees west (N. 46° W.) from the largest outer rock of the reef off Russian River.

A wire cable was stretched for one hundred and fifty yards from a point on the main bluff to a rock close under the extremity of the head, and vessels loading were moored under it. The mooring buoys were placed outside, so that vessels could warp out. The cable has been taken down (1884) and the business carried to Russian Gulch Landing.

The cove under Rules Head was known to the Russians as the "harbor sheltered for bai darkas, *i. e.*, for the skin canoes of the Aleutian otter hunters.

Russian Gulch Landing.—Two miles from Channel Rock, at the mouth of Russian River, a very deep gulch, two hundred yards wide, opens on the ocean; it is five hundred feet deep within one mile inland. The only sand beach along this stretch north of the Russian River is at this opening. The cliffs on the northwest and southeast are very high and rocky. From the northwest point of cliff a line of small rocks stretches out six hundred yards to the south; and off the southeast point of the cliff lies another but shorter line in the direction towards the end of the western line. Kelp lies among and between the rocks and nearer the shore. The passage-way between the two lines of rocks is about one hundred yards wide with three and a half fathoms of water in it, and seven fathoms near the outer rocks. It is through this passage-way that vessels must go to the landing. A short, very steep chute is built out from the southeast point towards the northwest point, and under the latter lies a mooring-buoy. The vessel when loading is moored in eleven feet of water under the end of the chute. A mooring-buoy is laid in four fathoms under the western rocks in the passage, and another between the outer two rocks on the east side of the passage. A sunken rock is reported outside the visible rocks.

Point Reyes can be plainly seen from this landing; and Bodega Head is on line with the rock off Russian River.

FORT ROSS ANCHORAGE.

From Channel Rock, off the south point of Russian River, to the point called Northwest Cape,* forming the western part of Fort Ross Anchorage, the bearing is north seventy degrees west (N. 70° W.), and the distance seven miles. The direction of the shore is nearly straight, with high, craggy cliffs from one hundred to one hundred and eighty feet above the sea, broken by numerous gulches and bordered by rocks generally quite close under the shore. Part of it has been described under Rules Landing and Russian Gulch Landing.

Northward of the Russian River the high coast hills again crowd close upon the sea board. They are covered with forests of redwood, pine, and fir trees, which gradually come down closer to the shore as we approach the Fort Ross Anchorage. About two and a half miles east-southeast from Fort Ross cove, where the timber begins to skirt the coast, a bold spur of the mountains comes directly upon the sea; within less than a mile therefrom it is sixteen hundred and nineteen feet in elevation, and it is eight hundred feet in elevation within less than four hundred yards of the shore. This is elsewhere described as the Cabo de Pinos. The Russian vessels used this as a distinctive mark for making the anchorage; the present coasters add to this other but slight local features.

The Fort Ross Anchorage is a small cove, broad open to the southwest swell, and only partially protected from the northwest swell. The bluff shore makes a sharp curve to the southward and westward for one-quarter of a mile, and this affords a lee in the northwest summer winds. The extent of the cove may be considered to reach from the southern extremity of the bluff to a point of bluff eighty feet high three-eighths of a mile east by north half north (E. by N. ½ N.) therefrom. The three fathom curve keeps moderately close to the western cliffs, being only about one hundred yards out. Two mooring-buoys are laid in the cove in five and a half and eight fathoms of water, whilst a third and outer buoy marks the *sunken rock*, bare at low water, three hundred yards one-quarter north (E. ¼ N.) from the southwest point of the bluff, and three hundred and ten yards south seventy degrees east (S. 70° E.) from the end of the chute. There is a depth of six and seven fathoms over rocky bottom between this rock, awash at low water, and the chute, and a depth of ten fathoms is found just outside of it, but some broken ground with as little as fourteen feet of water lies almost north distant seventy five yards from the same rock, and thence to the point north-northeast (NNE.) from it there is a reef on which the swell breaks in heavy weather.

The anchorage for small vessels is close under the cliffs on the west side of the cove and inside the southeast buoy which marks the danger already mentioned. There is room for two vessels in

* So named by the Russians: Tebenkoff, 1848.

the cove at one time. In winter small vessels make fast to the southeast buoy, and, with lines to the shore, frequently ride out heavy southeasters. But the anchorage is bad for large vessels because the bottom is rocky, and they are likely to lose their anchors. A chute is built out to the east-southeast from the western cliffs and projects over twelve feet of water, where a vessel of seventy-five tons can lie broadside to the end of the chute and head out; she has to be moored by six lines to buoys and shore fastenings. Coasting vessels load fire-wood, tan-bark, redwood posts, farm produce, etc., for San Francisco. This was the first of the small trading harbors on the coast north of San Francisco. About sixty cargoes have been loaded here annually.

There is no kelp in the cove, but patches of it close inshore, about half a mile to the southeastward. Outside the harbor, in fifteen fathoms, the bottom is sand, gravel, and broken shells.

A fresh-water stream enters at the eastern part of the cove where there is a short, broad sand beach. There is a depth of twelve feet of water close to this beach.

Dangers in the approaches to Fort Ross Anchorage: *A patch of sunken rocks* marked by kelp lies three hundred and sixty yards south twenty-six degrees west (S. 26° W.) from the southwest point of the cliff to the westward of the cove, one-quarter of a mile south forty degrees east (S. 40° E.) from the extreme western part of the same point, and one-quarter of a mile south fifty-nine degrees west (S. 59° W.) from the southeast buoy in the cove. This patch lies on the range of the outermost visible rocks off the southwest point of cliff on with the old Russian church; and the southeast buoy on with the point of the eighty feet cliff, forming the eastern limit of the cove. There is deep water, from five to ten fathoms, all around these sunken rocks, and they are especially dangerous to sailing vessels hugging the western point of the cove when coming in to the anchorage with the usual northwest winds.

A *sunken rock* lies in the westernmost point of the kelp field southeastward from the cove and two hundred and eighty yards from the nearest part of the shore. It bears south eighty-two degrees east (S. 82° E.), distant a little more than three-eighths of a mile from the southwest point of the cliff on the west side of the cove, and the southeast buoy lies just to the northward of the line between them. It lies on the range of the old Russian church and the extreme point of the shore under the eighty-feet cliff in the eastern part of the cove. It has from five and a quarter to eight fathoms of water all around it. A quarter of a mile to the eastward of it, the three-fathom line stretches well off from shore, embracing foul ground and visible rocks.

The Pinnacle Rocks, having a height of thirty-five feet, lie one mile southeast from Fort Ross Cove and one third of a mile off shore, close to the ten fathom line. There is a reef locally known as *Fort Ross Reef* connecting the rocks with the shore, which is a bold, pointed cliff one hundred and eight feet high, known to the Russians as Southeast Cape. These rocks are therefore a danger to small vessels beating northward close under the shore.

Another danger in the approaches to Fort Ross lies two and one-quarter miles south sixty-four degrees east (S. 64° E.) from the Northwest Cape, and two-thirds of a mile off shore; it consists of a reef of sunken rocks, and is in the way of small coasters beating up close under the shore. It is more minutely described under the head of Hydrography of the Coast between Bodega Head and Fort Ross, page 258.

Off the western part of the Northwest Cape, rocks lie quite thick close under the shore, with an islet of thirty yards in extent one-fifth of a mile distant. A small patch of rocks twenty feet high lies one quarter of a mile northwest of the latter and one-fifth of a mile off shore.

Off Northwest Cape, the *eddy inshore current* generally sets to the northward at from one quarter to one-half mile per hour, following the line of the coast and having a breadth of one to two miles. Sometimes this current is reversed in continued heavy northwesters.

The geographical position of the U. S. Coast and Geodetic Survey station on the extreme western part of Northwest Cape, fifty-six feet above the sea, is:

Latitude	38°	30′	36″.8 north.
Longitude	123°	15′	14″ west.
Or, in time	8h	13m	00s.9

The magnetic variation was 16° 55′ east in January, 1885, with an annual increase of 0′.5.

From Fort Ross Cove the highest part of Bodega Head shows just a trifle to the west of the summit of Tomales Ridge.

Fort Ross was first settled by the Russians in 1811. It was the headquarters of their sea-otter hunting in this region, and they had eight hundred natives from Kadiah with their bidarkas or skin canoes. The Wallalakh Indians were a powerful tribe just north of the settlement.

HYDROGRAPHY OF THE COAST BETWEEN BODEGA HEAD AND FORT ROSS.

Along the rocky, bluff shore from Bodega Head northwest for one and a half miles the ten fathom line of soundings lies between one-third and one-half of a mile off shore, with the three fathom curve one hundred and fifty yards from the shore. The bottom is irregular, rocky, with gray sand and broken shells. A very small patch of kelp lies off the slight indentation half a mile from the northwest point of the Head. Off shore the twenty-fathom line lies about one mile distant from shore, gradually approaching at the northwest point, where the thirty-fathom line is only a mile distant. The forty-fathom curve is two miles off shore. The bottom generally is green mud, with occasional coarse gray sand and broken shells.

Northward of Bodega Head, the ten-fathom line keeps within half a mile of the shore nearly to the mouth of the Russian River. One and a half miles north of Salmon Creek a few patches of kelp are found inside of eight fathoms, and a small patch under Duncan's Landing. The twenty fathom line lies one and a half miles off shore, the thirty-fathom two miles, and the forty-fathom line three miles. The bottom changes slightly from the green mud to fine gray sand, except beyond thirty fathoms, where the green mud still prevails. There are no kelp patches to the Russian River.

Dangers off Russian River.—Off the Russian River the ten-fathom line lies seven-eighths of a mile from the beach, just outside a small patch of rocks above water called the *Out Rocks*. The patch is only one hundred and fifty yards in extent, and is surrounded by eight or ten fathoms of water without any dangers immediately around it. They lie south seventy-two degrees west (S. 72° W.) three-quarters of a mile from the Channel Islet. Midway between these rocks and the south bluff of Russian River entrance is another rock above water. It has six fathoms all around it. One-third of a mile north by west (N. by W.) from the Out Rocks lies a small rock above water, with eight fathoms close to it, but *two sunken rocks* lie two hundred yards to the northwest of the small rock.

From Russian River northwestward the ten-fathom curve runs within one-third of a mile of the coast cliffs, with visible and sunken rocks coming well out to it. There are no kelp patches except a very small one close in to the mouth of Russian Gulch, one and two-thirds miles northwest of Russian River.

The twenty-fathom curve is two miles off shore, with gray sand and broken shells, and the thirty-fathom curve is nearly three miles out, with green mud.

Dangers.—In latitude 38° 29′, two and a quarter miles south sixty-four degrees east (S. 64° E.) from Northwest Cape, at Fort Ross Cove, the ten-fathom curve pushes out for one mile to embrace foul bottom, one-quarter of a mile square, with several sunken rocks having from six to eighteen feet over them, and with irregular bottom hence to the shore. These dangers extend outside the line from Northwest Cape to Salt Point, and are very treacherous because the several rocky heads have from four to six fathoms between them, with nine fathoms close outside. One of these heads is nearly awash, and they are so small that they are not often marked by breakers. A kelp field makes out to the northwest edge of this broken ground, and it should be avoided. The mark for this danger is that part of the high, bold land coming upon the shore heavily timbered. The twenty fathom line is only a quarter of a mile outside this danger, but to the northwest it soon moves shoreward and is only one-third of a mile outside Northwest Cape. The kelp is found outside the four-fathom line for three miles along shore south of Fort Ross.

Off Fort Ross, the forty-fathom line is only two miles distant over a bottom of green mud, which runs into twenty-five fathoms.

OFF-SHORE SOUNDINGS.

In a general west by south (W. by S.) direction from Northwest Cape, the U. S. steamer *Active* ran a line of deep-sea soundings, November 3 and 4, 1873, as follows:

Miles and bearing from Northwest Cape.	Depth in fathoms.	Latitude.	Longitude	Temp water. Fahr.	Character of bottom.
[illegible] S. 84 W.	81	38 32	123 24	.....	
[illegible] S. 84 W.	173	38 33	123 31	.....	
[illegible] S. 7 W.	520	38 31	123 41	.....	
[illegible] S. 7 W.	914	38 31	123 46	35.8	Clay mud.
2.0 S. 76 W.	1,586	38 32	123 53	34.7	Ooze.
[illegible] S. 78 W.	1,821	38 34	124 09	.....	Clay ooze.
[illegible] S. 7 W.	2,115	38 38	124 32	.....	Do.
[illegible] S. 7 W.	668	38 37	125 28	34.7	Do.
[illegible] S. W.	[illegible]	[illegible] 27	125 57	34.6	Gray and blackish ooze.

CABO DE PINOS.

For the part of the coast near Fort Ross, about latitude 38° 30′ north, one of the most prominent landfalls is Ross Mountain, already described on page 167. It is visible at a distance of fifty-three miles, or fifty miles off the coast, and was used as a station point in the examination of the Cordell Bank. When a vessel is well off shore and coming from the southward, the peculiarities of the immediate shore-line are not noticed, but the bolder features of the mountain masses are very well made out and used as landfalls and landmarks. Immediately behind Fort Ross Cove the great pine-covered coast mountains, culminating in Ross Mountain, crowd close upon the sea and present the appearance of a great wooded cape or headland (see page 256). This is the landfall which Cabrillo made in November, 1542, after running before the southeast gale which struck him off Cape San Martin; and when he was off this Cape of Pines he saw the high mountains behind Point Arena. He made it again on his southward passage; and in 1543, when his successor, Ferrelo, went still higher up the coast, he made this great cape, covered with pines, on both the northern and southern trip. It was their principal point of departure in these latitudes. He placed it in latitude thirty-eight and two-thirds degrees. Adopting the correction found from other well-determined points, this would reduce to about 38° 30′. The greater mass may be considered as being between latitudes 38° 30′ and 38° 34′ according to the latest determinations.

The two most prominent mountains in the mass to the northwestward of Ross Mountain are: *Spur Mountain*, in latitude 38° 34′ 15″.5 north, longitude 123° 10′ 04″.6 west, the wooded summit of which rises to twenty-one hundred feet above the sea. The other is *Table Mountain*, a long, flat, wooded ridge, seventeen hundred and seventy-five feet above the sea, in latitude 38° 35′ 34″.5 north, longitude 123° 12′ 32″.7 west.

FROM FORT ROSS TO POINT ARENA.

The general direction of this part of the coast is north fifty-seven degrees west (N. 57° W.) and the distance thirty-six and a half miles. The shores are bold, rocky cliffs, cut up by numerous gulches which open upon the ocean, and are bordered by rocks which are close inshore. There are no outlying dangers. The timber comes close to the shores, and the hills to the crest-line are covered with forests. A large traffic in lumber is carried on at numerous very small coves and landings along this short stretch of coast, which is broken about midway by the Walalla River forcing a passage through the first or outer line of coast mountains where they are over fifteen hundred feet high.

HYDROGRAPHY FROM FORT ROSS TO POINT ARENA.

Broad off Fort Ross Cove, the ten-fathom line of soundings is within one-fifth of a mile of the shore, and all known dangers and the kelp patches lie inside of it. It follows the general irregularities of the coast northward, sometimes being a little closer and sometimes a little farther off. The bottom is rocky and frequently irregular.

The twenty fathom line off Fort Ross Cove is two-sevenths of a mile from shore, and is more nearly parallel with the coast-line between the smaller points, occasionally following the deeper indentations, as at the cove between Stillwater and Gerstles Coves. The character of the bottom changes from rocky to gravel, fine gray sand, and broken shells.

The thirty-fathom line off Fort Ross Cove is three-quarters of a mile from shore, and to the northward is less regular in its distance than the twenty-fathom line, being only half a mile off at Salt Point, and one mile off between Miller's Gulch and Fisk Mill Cove. The bottom is generally broken shells with coral, fine gray sand, black mud, and green mud.

The forty fathom line off Fort Ross Cove is two miles from shore, but to the northward it is somewhat nearer. The bottom is quite regular, and its character very soon changes from the fine gray sand, etc., of the thirty-fathom line to green mud, which is found beyond the forty-fathom curve, and is supposed to change to the green ooze of the Pacific Plateau.

These are the general features of the coast hence to Point Arena. Special details will be given for the various localities.

The principal points for lumber and produce shipments in the stretch of coast from Fort Ross to Point Arena are as follows:

Timber Cove.—This is an anchorage for small coasting vessels in northwest winds, but is broad open to the southwest and south. It is bad for vessels drawing over ten feet of water on account

of patches of thick kelp. They are compelled to anchor so far out that they have no protection from the swell which breaks outside the cove when the weather is rough. The western point of this anchorage is one hundred and sixty feet high, and lies one and three-quarters miles north fifty seven degrees west (N. 57° W.) from the southwest point of Fort Ross Anchorage. The cliff and shore-line retreat nearly a third of a mile to the northeast by east half east (NE. by E. ½ E.). Four hundred yards inside the point and in the northwest part of the cove, a chute has been built out to sixteen feet of water for the loading of wood, tan-bark, produce, etc. A vessel lies broadside to the end of the chute with five mooring-lines. Abreast the chute the three-fathom line lies out one hundred and twenty-five yards, and four hundred yards from the extremity of the point; three hundred yards south by east (S. by E.) from the chute lies a *sunken rock* with thirteen feet of water upon it and four and a half fathoms all around it. It was marked by a buoy. Even with a tolerably large southwest swell the sea does not break on this rock. There is reported a *sunken rock* with seven feet of water upon it between the chute and the inner mooring anchor.

Two mooring-buoys have been laid down in the cove in four and seven and a half fathoms two hundred yards apart and nearly northwest and southeast from each other. Vessels anchor between them, and must not anchor inside the northwest mooring on account of sunken rocks. Vessels load here winter and summer in smooth weather. They carry away wood, posts, and tan bark. There is no chance to repair a vessel here. The British ship *Windermere* was a total wreck here September 7, 1883.

In beating up from the southeastward avoid the *two sunken rocks* which lie half a mile south fifty-one degrees east (S. 51° E.) from the outer point of the cove, and two hundred and fifty yards off the shore. There is a depth of four and a half fathoms close around them.

Through the kelp in Timber Cove from six to three fathoms can be carried, and no other sunken rocks are known.

The ten-fathom curve lies within two hundred yards of the cliff west of the anchorage, with kelp inside in seven and eight fathoms. The thirty-fathom curve lies five-sixths of a mile off the cliff over bottom varying from rocky to green mud. The forty-fathom curve lies two miles off, with green mud.

For six miles to the southeastward of Timber Cove the eddy current generally sets to the northwestward at the rate of six to twelve miles per day. It closely follows the shore, being only one to two miles broad. Sometimes this close-eddy shore-current is reversed in strong, northwest weather.

Stillwater Cove.—This is a very contracted anchorage and unsheltered. It is less than three-quarters of a mile northwest of Timber Cove, under a cliff seventy-five feet high. Between the two places the cliff is eighty feet high, with a rocky islet midway, surrounded by kelp. The cliff is bordered all round its base with rocks above water. The cove is broad open to the south and southwest. There is a chute here running from the cliff to beyond the outer rocks, with eleven feet of water under its extremity. A vessel lies broadside to the chute with six mooring lines. There are two mooring-buoys—one in five fathoms, about one hundred and twenty-five yards south of the chute, and the other in ten fathoms, four hundred yards south of the chute. The bottom is rocky, and the coasters anchor to windward of the north buoy. It is not considered so good a landing as Timber Cove, but vessels load here all the year in smooth weather.

There is reported to be much undertow here; and when the weather is rough the breakers extend outside the cove, and are then especially heavy off the western point.

Coasters carry wood, posts, railroad-ties, and tan bark hence to San Francisco.

The forest comes almost to the edge of the cliffs at this place.

The ten-fathom curve lies only one-sixth of a mile off the shore at Stillwater Cove, and lies on the outside limit of the patch of kelp one-third of a mile south. The bottom is hard and rocky. The twenty-fathom curve is half a mile from shore and the bottom is sand, broken shells, coarse gravel, and coral. The thirty-fathom curve is seven-eighths of a mile off shore, with bottom of sand, broken shells, and coral. The forty-fathom line is two miles off shore, quite irregular, and the bottom green mud. Thence the depth increases gradually over the same kind of bottom.

Gerstles Cove or Salt Point Landing.—Salt Point, forming the western point of this cove, lies five miles north sixty-seven degrees west (N. 67° W.) from Northwest Cape. It is thirty-five feet high, very rocky, bordered by rocks above water for two hundred yards, and has no trees upon it. Kelp lies off the rocks for one hundred and fifty yards to eight fathoms. The Salt Point settle

ment is one-third of a mile inside the point and under the edge of the forest. From the outer rocks the bluff shore runs one-quarter of a mile to the northeast, with a contracted pocket one hundred and fifty yards deep, from the northwest side of which formerly stretched out two chutes. It is broad open to the southwest, and has but a moderate protection in northwest winds. The swell from southeast to west (SE. to W.) sets in heavy, and breaks well outside the cove along a line of sunken rocks which form a curved line parallel with the shore. The outer chute is abandoned. The inner one has been substantially rebuilt, changed in direction, and extended out to thirteen feet of water. At the end of the chute a vessel lies broadside on with six mooring-lines. Two vessels of eighty tons each can lie in this cove in smooth weather in summer. At the time of the topographical survey there were four mooring-buoys; the two inner ones lie in five and six fathoms of water east and west from each other, and the outer in ten fathoms. From the outer buoy the course in is north-northwest (NNW.) past the second buoy and directly into the deepest part of the cove. There are *two sunken rocks* east and west of the buoy. One *sunken rock* with only seven feet of water on it lies thirty yards to the east-northeast (ENE.) from the outer mooring-buoy.

The moorings were good but are now out of repair. Schooners carry away wood, posts, tan-bark and produce. The lumber-mill formerly running on Miller Creek, one mile north, and which sent its lumber by rail to the chutes, has been moved away.

The geographical position of Salt Point, as determined by the Coast and Geodetic Survey, is:

Latitude	38° 33′ 48″ north.
Longitude	123° 19′ 59″ west.
Or, in time	8h 13m 19s.9

The magnetic variation in 1885 was 17°.00′ east, and the annual increase was half a minute of arc.

At Salt Point the ten-fathom curve is distant only one-eighth of a mile at the limit of the kelp field. Inside of it the bottom is rocky and irregular. The twenty-fathom curve is one-quarter of a mile from shore, with sand and broken shells; the thirty-fathom curve is half a mile from shore, with bottom of green mud and broken shells; the forty-fathom curve is one and one-third miles from shore, with regular bottom of green mud.

At Salt Point the general trend of the immediate coast-line swings more to the eastward and runs northwest three-quarters west (NW. ¾ W.). A small stream enters the sea about one mile northwest from Salt Point in a small but deep indentation called Miller Gulch. This stream is called the Dirado on the Russian charts of Tebenkoff.

Fisk Mill Cove lies two and one-third miles northwest from Salt Point, and is an anchorage broad open to the south and southwest. The cliff forming the western point of the cove is forty feet high, and bordered by rocks above water, close up to which ten fathoms can be carried.

These rocky masses, and the higher point running one mile to the west-northwest, break the force of the northwest swell and enable vessels to use this as a fair summer anchorage, but there is no shelter from southeast around to the west. There is good water here, no hidden dangers, and the three-fathom line lies within one hundred yards of the bluff. Vessels of one hundred tons can moor here. There are four mooring-buoys: two lie one hundred yards from the extremity of the chute in seven and eight fathoms, and an outer one lies in twelve fathoms about three hundred yards south-southeast (SSE.) from the chute; the fourth mooring-buoy lies on the south side, and near the outer limits of the rocks to the westward of the anchorage.

The chute is on the extremity of the south point of the western side of the cove, with a reef of low, flat rocks lying to the south-southwest only two hundred yards from shore.

In tough weather the line of breakers runs very close along the shore under the rocks and inside the end of the chute. A vessel lies broadside to the end of the chute in fourteen feet of water and has six mooring lines. She hauls out to the southern buoy.

A mass of kelp lies one-fifth of a mile east of the third buoy, and borders the shore in five to seven fathoms of water for one mile southeast to Miller Gulch.

It is said that vessels can lie here longer in southeast weather than at most of the small coves, because the deep water is found well inshore. The shipments are lumber, wood, bark and posts; about forty schooners load here during the year. The lumber is got out at Platt's mill, about one and three-quarters miles up the coast from this place. There is quite a village half a mile inside the point.

The ten-fathom curve of soundings is only three hundred yards off the north shore at Fisk Mill Cove and just outside the outer visible rocks. The bottom is hard and rocky. The twenty-

fathom curve is a little more than one-quarter of a mile off shore, and the bottom is fine gray sand, broken shells, and coral. The thirty-fathom curve is two thirds of a mile from shore, and at the outer edge of a bottom of mud, gravel, and broken shells. The forty-fathom curve is one and two thirds miles off shore; the bottom quite regular of green mud. Thence the depth increases very regularly.

Horseshoe Point is a cliff one hundred and eighty feet high, three miles north fifty-three degrees west (N. 53° W.) from Salt Point, with a depression of sixty feet immediately behind it. There are no trees for one-third of a mile back, but the summit of the point is marked by projecting masses of rock. The seaward face is bordered by large rocky patches; but the ten fathom line passes close outside them, and the twenty-fathom line is only four hundred yards from them; the bottom is rocky and fine gray sand.

On the north side of the point is an indentation of one-third of a mile, forming a horseshoe cove open directly to the northwest. In this cove is a small field of kelp with five to six fathoms water. The ten-fathom line sweeps inside of the bounding points.

On the north side of the Horseshoe Cove the forest comes almost to the edge of the cliff for a mile, and then falls back a few hundred yards in places.

The geographical position of the Coast Survey station on the northernmost part of the point is:

Latitude	38° 36′ 1ˢ .7 north.
Longitude	123° 22′ 10ˢ .5 west.
Or, in time	8ʰ 13ᵐ 28ˢ.7.

The thirty-fathom curve is two-thirds of a mile from the shore, with bottom of gravel, broken shells, and mud. The forty-fathom line is one and two-thirds miles from shore, with the bottom changing from gravel, broken shells, and mud to green mud. Beyond forty fathoms the depth changes gradually.

From Horseshoe Point the coast-line runs nearly straight northwest by west (NW. by W.) for twelve and a half miles to the mouth of the Walalla River, at no place retreating over a mile to the eastward of that course.

The shore continues marked by broken cliffs, averaging sixty feet above the sea, bordered by rocks close under them; and the land generally rises without trees from one-eighth to half a mile inland, when the forests begin and cover the high coast hills to fifteen hundred feet.

In January, 1885, the line of equal magnetic declination of seventeen degrees east cut the coast-line in latitude 38° 38′, and moves nearly one minute of arc annually to the northward.

Stewart's Point.—This point, forty-four feet high, lies nearly three and a half miles north forty-nine degrees west (N. 49° W.) from Horseshoe Point, and twenty-two miles southeast by east half east (SE. by E. ½ E.) from Point Arena. From Horseshoe Cove to Stewart's Point the rocky shores are nearly straight and bordered by rocks above water, with cliffs sixty feet high. There are no outlying dangers, but a patch of kelp lies one mile south of the point.

Stewart's Point Landing or *Fisherman's Bay* is half a mile southeast from Stewart's Point. The shore is formed of broken cliffs fifty feet high and closely bordered by many small rocks. The anchorage is a contracted indentation of three hundred yards width and four hundred and fifty yards depth east and west, with bluff shores and bluff points at the southeast and northwest, both guarded by rocks above water. It opens square to the west. Outside and off the southern point there are two small patches of kelp, each one hundred and fifty yards in extent, with *two sunken rocks*, having eleven feet of water upon them in the northern patch and five to six fathoms in the southern patch. There are from six to seven fathoms of water all around these kelp patches. A buoy has been placed in the northern kelp patch between the two sunken rocks. In the northeast part of the cove there is a small indentation over which projected the chutes for loading vessels.

The three-fathom line runs well into the cove, which can be entered with five to six fathoms of water over hard bottom and fine gray sand. In 1877 there were three chutes whence lumber was loaded on the schooners. The outer chute has been carried away, and the inner one is used. The kelp reaches into the middle chute. There were three mills, one of which was close to the shipping point, and the others back in the forest. They are abandoned, and a small shingle mill, one and a half miles up the coast, is the only one running.

In 1885 only one chute, the middle one, was in running order. It extends from the cliff over the rocks out to eleven feet of water, and vessels of one hundred and twenty-five tons may moor in the cove. Vessels lie broadside to the end of the chute and use seven mooring-lines. They haul out to one or the other mooring-buoy, according to the direction of the wind. When the

weather is rough, the line of breakers on the west and northwest is close under the outer line of rocks; towards the southeast there is an outer reef of rocks showing only at very low water.

On an average there are twenty-five schooners loaded with wood, posts, tan-bark, and shingles in the year.

There are two mooring-buoys inside the entrance, and a third one hundred yards outside towards the northern patch of kelp.

The ten-fathom curve of soundings lies just outside the visible rocks and breakers off Stewart's Point, and just outside the sunken rocks in the kelp off the cove. It is about one sixth of a mile from shore, with irregular, rocky bottom. The twenty-fathom line, over a bottom of fine sand, broken shells, and gravel, lies less than half a mile outside the point; whilst the forty fathom line, over green mud, is only one and a half miles from shore. At three miles we find fifty fathoms over the same kind of bottom.

Bihler Point Landing.—Five and a half miles north sixty-one degrees west (N. 61° W.) from Horseshoe Point is a double-headed point with steep cliffs fifty to sixty feet high, and bordered by numerous rocks above water. Under the southern of the two points is a very contracted and poor anchorage open from northwest to southeast; a rocky islet on the south shore makes this cove the narrowest on the coast. The three fathom line reaches in very nearly to the rocky islet. There are two chutes, of which the inner one is not used and the outer one seems a fair place to load at.

This chute extends from the bluff to twenty-three feet of water, and a vessel lies broadside to the end with six mooring-lines. There are breakers close under the starboard bow of the vessel at the chute and breakers to the eastward only fifty yards distant. The swell affects the vessel at the chute. There are three mooring buoys. The inner one of them is one hundred yards southeast of the outer chute, and lies in five or six fathoms of water, with a rock above water thirty yards northeast and a sunken rock with eleven feet upon it seventy yards southeast. The outermost buoy lies in ten fathoms two hundred and twenty yards south by east (S. by E.) from the inner one, and the third buoy lies between this outer one and the northwest point of the cove. This is a summer landing only, and an average of five small schooners per month load wood, posts, tan-bark, and stave-bolts. Three vessels may lie at anchor in the cove, but the place is dangerous from October to June.

The geographical position of the Coast Survey station on the point is:

Latitude	38°	40′	36.6″	north.
Longitude	123°	2′	54″	west.
Or, in time	8h	12m	43.6s.	

The ten-fathom line of soundings lies close under the north point of the landing, but two hundred and twenty yards off the visible rocks at the point one-quarter of a mile northwest of the landing. The bottom is rocky and very irregular. The twenty-fathom line lies one-third of a mile from shore, and the forty-fathom one and three-quarters miles with regular bottom of fine green mud.

WALALLA RIVER.

From Bihler Point the first point to the northwest is Walalla Point Island. The coast-line recedes eastward of the line joining the two about half a mile. It has the same cliff shores, but somewhat lower, broken by gulches and bordered by innumerable rocks close under the cliffs. The rising table land is destitute of trees for one-third of a mile back, and thence the pine forest reaches to the hill-tops. Four miles northwest from Bihler Landing and three miles southeast of Walalla River, there is a sand beach open to the northwest, and the sand therefrom is driven over the land in long drifts of dunes for nearly half a mile, parallel with the shore, and from one hundred to two hundred and fifty yards from it. These are an unusual feature in this vicinity and readily noticeable from seaward.

Northward of Bihler Point the kelp becomes more compact under the shore, extending out gradually to six fathoms. It is irregularly broken for one and a half miles south of Walalla Point Island, and north of it lies close under the shore in four and five fathoms of water to the mouth of the river.

Walalla Point Island is a rocky islet, forty two feet above the sea, connected with the bluff by a rocky reef. The geographical position of the Coast Survey station upon it is:

Latitude	38°	41′	55″ north.
Longitude	123°	31′	46″ west.

Behind the rocky, bluff point abreast the island is another drift of sand dunes, six hundred and fifty yards long east-southeast from the beach where it is taken up.

The mouth of Walalla River lies exactly one mile north twenty-eight degrees west (N. 28 W.) from Walalla Point Island, and sixteen and a half miles southeastwardly from Point Arena Light-house. The stream rises in the coast mountains on the north flank of Ross Mountain, runs northwestward parallel with the coast-line for twenty or twenty five miles and distant therefrom four or five miles, but with the high, timbered coast ridge of fifteen hundred to two thousand feet intervening. It changes its direction very abruptly and breaks through the high mountain range, reaching the coast with an average breadth of one hundred yards. Within a mile of its mouth it runs west-northwest for three-quarters of a mile, and opens directly against the northwest swell and wind. A great barrier of sand and gravel stretches out from the south point for seven hundred and fifty yards towards the north cliff, and in dry seasons completely bars the river so that there is no communication with the sea. In the rainy season this barrier is cut through by the increased volume of water, and generally opens under the rocky north bank.

Schooners formerly came to Walalla to load tan-bark, ties, posts, fire-wood, etc. There are two cable-chutes under the north bluff, broad open to the sea. From the cliff, sixty feet high, wire cables were passed between the masts of the schooners and fastened to heavy moorings outside, and engines on shore lowered or hoisted the loads along the cable. This was known as the Walalla or Robinson's Landing, but it was abandoned in 1884 and the moorings taken up.

Walalla Reef is a cluster of twenty-five or thirty rocks above water, and covering an area of one hundred and fifty by three hundred yards, with a sunken rock and breaker seventy yards west-northwest (WNW.) from the northern visible rock. The westernmost rock of the reef lies south forty-two degrees west (S. 42° W.) one-third of a mile from the chute, and north fifty degrees west (N. 50° W.) a little more than one and one-eighth miles from Walalla Point Island.

Off Walalla Point Island the ten-fathom curve is within two hundred yards of its western edge, or one-third of a mile from shore. The twenty-fathom curve is two thirds of a mile from shore, the thirty-fathom one and one eighth miles, and the forty-fathom two miles from shore.

The Gualala Mills are on a small creek coming into the north side of the Walalla River one third of a mile inside the mouth. The lumber is sent two miles by rail to Bowen's Landing.

The proper name of the place and river is Walalla; the spelling Gualala is a curious attempt to make a Spanish word out of the proper name. The Russian records show that at the first settlement of Fort Ross, in 1811, the officer in charge endeavored to make friends of the Wallalakh, a strong tribe of Indians then living along this stretch of coast. On the Russian charts a stream is designated in this locality, but no name is given to it.*

One of the Coast Survey stations (Walalla) on the north side of the great bend of the river, and three or four miles from the coast, has an elevation of twenty-one hundred and ninety-two feet, and this may be taken as the general elevation of the landfall on this part of the coast.

Bowen's Landing.—One and a half miles northwest of the Walalla River and fourteen miles southeast from Point Arena, is this small, contracted anchorage, not over two hundred and fifty yards in extent, with the kelp broad across the entrance in five and six fathoms. The shores are sixty feet high and bluff. The southwest point is broken, jagged, and bordered by numerous rocks above water and close under the cliffs. There is a large rock, called the *Bowen Rock*, sixty yards in extent, six hundred and fifty yards south forty-one degrees east (S. 41° E.) from the end of the northern chute, and a *sunken rock* eighty yards from the chute on the same bearing. The *Jeff Davis sunken rock* lies south twenty-two degrees east (S. 22° E.) seven hundred and fifty yards from the chute, and two hundred and twenty yards southwest by south (SW. by S.) from the Bowen Rock. A *third sunken rock* lies south sixty-four degrees west (S. 64° W.) four hundred yards from the chute. Southeast and southwest of the northern chute lie fine mooring-buoys, the farthest being two hundred and seventy-five yards off. This chute, over two hundred feet long, runs from the southernmost part of the point, where the cliff is fifty-one feet high, out and over twenty-four feet of water where vessels lie broadside on, and can receive the lumber from the mill on the Walalla River. There is a *sunken reef* close astern of the vessel, and another to the east-southeast. Inside the chute there is a very small cove and beach with two small landing-wharves and a wharf to which one branch of the railroad runs; vessels loading here have to haul out at low water. The new wire-rope chute (called a trapeze chute) is stretched southeastward more than

* In a letter, dated October 7, 1843, from Kuskoff to Baranoff, he states that to the northward of the Fort Ross settlement there was a tribe of Indians, named the "Wallalakh," with whom he had established friendly relations. (Tikhmenieff's Historical Review of Russian Colonies in America, vol. II, p. 267, Appendix.)

one hundred yards from a point in the southeast part of the cove broad into the deep water, and a vessel lying under it to load is in twenty-four feet of water. It is secured to a heavy mooring-buoy. Outside of it and towards Bowen Rock there has been placed another buoy, and between this chute and the northern chute three new mooring-buoys have been laid. The lighters adjust these moorings when it is necessary. The mills can cut fifty-five thousand feet of lumber daily, and about one hundred and forty cargoes are shipped hence all the year round. Lumber only is shipped from the northern chute; wood, bark, railroad ties, posts, stave-bolts, etc., from the southern.

Six vessels of two hundred and fifty tons can lie here at moorings in summer, and four vessels of two hundred tons in winter.

The kelp from one-third of a mile southwest to one-quarter of a mile of Bowen's Landing stretches out into eight fathoms of water to embrace the sunken rocks and rocky islet south-southeast (SSE.) from the landing, but retreats to five fathoms immediately off the landing, and again stretches out to eight and nine fathoms west of it. The ten-fathom curve is in the outer limit of kelp, one-third of a mile from shore south of the landing, and less than one-fifth of a mile from shore at the west of it; but actually running within one hundred yards of the large rocky islet just west of the chute. The depth outside the fifteen-fathom line increases quite regularly, the twenty-fathom line being less than two-thirds of a mile from shore; the thirty-fathom line at one and a half miles, and the forty-fathom line at two and a half miles from shore.

The geographical position of the Coast Survey station on the southwestern extremity of the point, where it is forty-eight feet above the sea, is:

Latitude	38°	46′ 52″ north.
Longitude	123°	33′ 46″ west.

Collins Landing is two thirds of a mile northwest of Bowen's Landing, and is exposed to the western sea; except for a few outlying rocks above water, there is no protection. The line of breakers follows closely the outer line of sunken rocks. There is a chute stretching from the eighty-feet cliff to a rock lying just off it; and thence a wire cable (trapeze chute) is carried south for three hundred yards to a rock outside with six and seven fathoms of water close around it. A vessel under the Trapeze chute lies in twenty feet of water and has five mooring-lines. The Fish Rocks lie to the northwest, but too far off to afford any protection. Two mooring buoys have been laid one hundred yards and two hundred yards to the northwest of the end of the cable, close under the lee of a line of rocks, which is, however, too limited in extent to afford much shelter. A third mooring buoy has been laid about seventy yards to the southwest of the end of the wire cable, and a fourth mooring-buoy lies close under the chute and not over eighty yards from the rocks. The landing is used only in summer, and an average of twenty-five cargoes are shipped hence. No vessel can lie here in winter. The lumber-mill has been abandoned, but wood, posts, and tan-bark are still shipped.

Ravens Anchorage or *Fish Rock Landing.*—Four miles north fifty-eight degrees west (N. 58° W.) from Walalla Point Island, about twenty-four miles northwestward along the coast from Fort Ross, and twelve miles southeastwardly from Point Arena, lies this small cove under high, sparsely wooded bluffs; and protected from the northwest swell by the two high rocky islets lying outside. These islets are called the Fish Rocks and are described further on page 266. On the east face of the southwest point of the cove a broad beach of sand and rock stretches for eight hundred yards to the eastward. In the middle of this beach empties the stream through Fish Rock Gulch.

There is protection here from the northwest swell, but the cove is wide open to the southeast and southwest. Five or six vessels can lie at anchor in northwest weather under the high Fish Rocks; and moderately large vessels, of two hundred tons, may anchor close-in in the cove, east of the chute, but several *dangers* exist in the bay, as follows:

Two small rocks above water lie east by south (E. by S. two hundred and sixty yards from the western extremity of the point; close outside these lie *two sunken rocks*, the farther one seventy five yards south-southwest (SSW.). Half-way between these and the point to the northwest are *two other sunken rocks*, the outer one being in a rather large shoal patch with a reported depth of only four feet of water upon it.

The *chute* is located on the northeastern part of the bluff point; between it and the two rocks, but nearer the latter, is placed the mooring-buoy. One hundred yards north of this buoy is a patch of kelp. The chute projects from the cliffs in an easterly direction over fifteen feet of water. A vessel lies broadside to the end of it, heading south, with five or six mooring-lines. One moor-

ing-line leads to the rock already described as two hundred and sixty yards east by south from the point. Wood, posts, ties, etc., are shipped from here throughout the year.

From this anchorage can be heard the bellowing of the sea-lions on Fish Rocks.

The propeller *Arispe*, bound up the coast, was lost at Havens Anchorage in May, 1854.

In 1883 the wreck of the *Mary Zephyr*, stranded in 1881 in this cove, was still lying unbroken on the sand beach under the bluff.

In 1855 we anchored here and occupied a secondary astronomical station on the west side of the first gully eastwardly from the point. Its geographical position is:

Latitude	38° 47′ 5″.0 north.
Longitude	123° 35′ 02″.7 west.
Or, in time	8h 14m 20s.2.

Havens Anchorage was named by the Coast Survey in 1853. Locally the place is known as Fish Rock Landing.

Fish Rocks.—These are two high, rocky islets, connected at high water, and lying eight hundred and fifty yards south sixty-one degrees west (S. 61° W.) from the extremity of the bluff at Havens Anchorage. The outer rock, one hundred and fifty three feet high, is three hundred yards long northwest and southeast, and one hundred yards broad; the inner rock is one hundred feet high and about half the extent of the outer. They are connected by a narrow, rocky beach. One hundred and seventy five yards southeast (SE.) from the outer islet lies a rock forty feet out of water. All around these rocks are many small rocks above water. There is a passage-way of less than one hundred yards in width between the inner rock and the nearest point of the main land, but we do not know the depth of water through it. Five or six vessels can lie with safety under the protection of the Fish Rocks in heavy northwest blows. Sea-lions abound on these rocks and their bellowing can be heard nearly a mile distant.

Fish Rock lies south fifty-four degrees east (S. 54° E.) eleven and a half miles from Point Arena Light-house. It can not be seen from the Light house, however, owing to intervening points of land, but from a position two miles south of it, Fish Rock shows a little to the right of Havens Neck, and in range with the breakers on Saunders Reef, which lies four and a half miles north sixty three degrees west (N. 63° W.) from it.

For one mile south of Havens Anchorage and as far westward as the point abreast of Fish Rocks, the kelp keeps along the shore in from six and seven down to three and a half fathoms of water. Inside of it lie all the dangers south and east of the anchorage. The ten-fathom curve lies one quarter of a mile off shore south of the anchorage, and just outside of the Fish Rocks so as to include the small visible rocks off them. The twenty fathom line lies three-quarters of a mile from the shore, but only one-quarter of a mile outside the islets; the bottom is moderately regular. The thirty-fathom line is one and a half miles, and the forty-fathom line two and a half miles from shore, with regular bottom.

Havens Neck is a rocky, almost detached head, one hundred and forty-five feet above the sea, with precipitous sides and bordered by rocks. It is three hundred yards long northwest and southeast, treeless, and covered with rocks. It lies five miles north sixty-three degrees west (N. 63° W.) from Walalla Point Island, and eleven and a half miles along the coast southeast from Point Arena Light. The narrow neck two hundred yards behind it is seventy feet lower, and inside of it the land rises slowly to the timber line. Southeast of it, toward the Fish Rocks, are numerous small rocks above water and reported about nineteen feet high. To the northwestward the coast for one mile there is a chain of patches of rocks above water, with sunken rocks marked by kelp west and northwest of the farthest. The chain lies about five hundred yards off shore with deep water outside. The rocks of this chain nearest the Nip and Tuck Landing are about five feet high, the larger outer one being double-headed. The shore line is formed by steep cliffs one hundred feet high, bordered by rocks and cut by gulches.

The landfall for this part of the coast is the pine-covered ridge culminating at Walalla Mountain which rises to twenty two hundred and seventeen feet elevation in latitude 38° 51′ 15″.6 north, longitude 123° 29′ 54″ west, being five miles from the nearest shore.

Nip and Tuck Landing is an open coast landing, with a chute from the seventy-five foot cliffs lying one mile north thirty-eight degrees west (N. 38° W.) from Havens Neck. The cliffs are on the south side of a deep, narrow gulch, crossed by a bridge sixty feet above the water and very close to the outer edge of the cliffs. The gulch is called Reesman Gulch. The landing is practically abandoned; only six vessels loaded here in 1883. The schooner *Caroline Medau* was wrecked here in October, 1883.

Signal Port or *Steens Landing* is one and one-third miles north forty-seven degrees west (N. 47° W.) from Havens Neck, and ten miles along the coast southeastwardly from Point Arena. It is an open landing (the indentation in the coast-line being little over one hundred yards), with a chute about two hundred yards in extreme length, built from the eighty-feet cliff over rocks into deep water, where vessels lie to load lumber, fire-wood, posts, tan-bark, etc.

There are rocks two hundred and twenty yards to the southwest; a *sunken rock* four hundred yards east by north (E. by N.) from the end of the chute; and patches of rock to the east-southeast. Two mooring-buoys lie one hundred and forty yards to the southwest of the chute; and a third one has been recently added (1884). The former name of this landing was Hardscratch.

The saw mill, erected in 1883, is three and a half miles from the landing. It can cut twenty-five thousand feet of lumber daily. About eight vessels load each month.

Sail Rock.—This is a sharp-pointed pyramidal rock, forty-four feet high, and fifty yards in extent at the water-line. It lies nearly eight hundred yards off shore and nearly midway between Steens Chute and Iversons Chute. It is two miles north sixty-seven degrees west (N. 67° W.) from Havens Neck; and two and three-quarters miles north sixty-three degrees west (N. 63° W.) from the Fish Rocks. This last course passes closely through Walalla Point Island, Fish Rocks, Sail Rock, and Saunders Reef. Coasting vessels from the northwestward, when one mile or more outside of Saunders Reef, can make a course southeast by east half east (SE. by E. ½ E.), parallel with the coast-line and outside of all dangers.

For three-quarters of a mile west northwest (WNW.) from Sail Rock lie two or three small patches of kelp.

Iverson Landing, at *Fergusons Cove*, lies three miles north sixty-one degrees west (N. 61° W.) from Havens Neck, and eight and one-quarter miles along the coast southeastwardly from Point Arena. The shore-line is of the same character of broken cliffs one hundred feet in elevation, bordered by innumerable rocks close inshore, with the outlying Sail Rock already described; and for three-quarters of a mile west-northwest from this rock lie two or three small patches of kelp.

Iverson Point, from which the Rough and Ready Landing chute formerly projected, is the westerly point of a small cove, full of rocks, and with a narrow entrance along the south shore. This is named *Fergusons Cove* or Rough and Ready. The Iverson Landing is said to be protected from the heavy northwesterly swell by the Saunders Reef, lying seven-eighths of a mile distant, from west by north to west-northwest (W. by N. to WNW.) This cove, under Iverson Point, is three hundred and fifty yards deep towards the east-northeast. It is surrounded by high, rocky cliffs, bordered in great measure by rocks, and is broad open to the west-southwest. The southeast point is eighty-seven feet high and free from rocks; it is really a large islet barely detached from the main-land. The northwest point is ninety feet high, but has a rocky islet, seventy yards in extent and sixty-six feet high, lying under its southeast face. Between this islet and the southeast point lies a cluster of low rocks stretching from the islet nearly to mid-entrance. The passage into the cove is between these rocks and the southeast point, and is only fifty yards in width.

The present chute is a small platform projecting from the southeast face of the north bluff; and is about sixty yards east-northeast and inside the islet under the northwest point. From this platform a cable is carried across the cove to the north face of the southeast point. Vessels lie under this cable with their sterns in seventeen feet of water and are moored to the rocks. Two heavy mooring-buoys lie outside the entrance.

The cove is considered a good summer "landing," and about thirty vessels load wood, tan-bark, posts, and ties. But when a heavy southwest swell comes in no vessel can withstand it. They must put out at the first indications of such a swell and run for Havens Anchorage until it abates.

Rough and Ready Landing.—The proprietor of Fergusons Cove was in 1885 re-erecting the platform for the trestle chute formerly located on Iverson's Point and which projected to the southward over deep water. This chute has been washed away three times, and is in a very exposed position. Vessels of one hundred tons can load under this chute with six mooring-lines out, but they are within thirty yards of the rocks. There is no chance to repair a vessel if she gets adrift.

Breakers are reported in the kelp field about half a mile or two-thirds of a mile southeast by south half south (SE. by S. ½ S.) from Iverson Point, so that vessels approaching these landings should avoid the kelp.

The geographical position of Iverson Point, as determined by the Coast and Geodetic Survey, is:

Latitude..... 38° 59′ 50″ north.
Longitude..... 123° 38′ 53″ west.

Saunders Landing.—The chute at this place is less than half a mile northwestwardly from Iverson Point, and eight miles southeastwardly from Point Arena. The high, rocky, retreating shore from Iverson Point to this landing is bordered by very many high, rocky islets. There is no cove here whatever; the cliffs are bold and about one hundred feet above the sea. The summit of the cliffs is treeless for one-third of a mile back from the water. The chute is quite long, and is carried from the ninety-feet cliff over a chasm to a small rocky islet forty-nine feet high, and then projected over the edge of the islet to the southwestward to five fathoms of water, where the schooners lie to load. The usual northwest swell is said to set in here somewhat from the westward. The lumber is hauled from Schooner Gulch to this chute, together with wood, ties, and posts.

Three mooring-buoys lie off the chute, as follows: one buoy south by east (S. by E.) one hundred and eighty-five yards; the outer one southwest by west (SW. by W.) one hundred and seventy-five yards; the third northwest by west half west (NW. by W. ½ W.) one hundred and fifty yards.

Saunders Reef lies from seven hundred and fifty to twelve hundred and thirty yards west three-quarters south (W. ¾ S.) from the chute, and affords some protection from the heavy summer swells, but there is no possible chance of saving [illegible] that goes ashore here. Shipments are made in winter and summer when the sea is smooth, and about seventeen schooners load here yearly.

On the north side of the chute islet there is a very slight indentation upon which opens *Rocky Gulch*, across which there is quite a long high bridge.

The *coast line* hence to the point just west of Arena Cove retreats half a mile to the eastward at one and a half miles above Iverson Point. It retains its steep cliff front bordered by rocks and reefs, and broken successively by Schooner Gulch, Gallaway Gulch, Ross Gulch, and Moat Gulch, through each of which a small stream runs to the beach. The forest retreats from the shores for over a mile at three miles from Iverson Point, and the hills only reach one thousand feet elevation at two miles inland. In the deepest part of the bight are several small fields of kelp; and a curious feature of the rocky beaches hence northward is the marked direction of the edges of the exposed rocks, the softer parts of the stratification having worn away, leaving the harder and sharper lines to indicate the trend, which is northwest and southeast.

Hydrography off Havens Neck and northward.—Commencing at Havens Neck, the outer edge of the kelp lies on the seven-fathom line and envelopes the dangers south of Nip and Tuck Landing, Steens Landing, and Iversons Landing. Sail Rock is the only exception; it has ten fathoms close under its west side, and the kelp line is three hundred yards to the northeast of it. Southeast of Iverson Point the ten-fathom line is very irregular, and extends nearly two-thirds of a mile from shore. The kelp follows this ten-fathom line. At Iverson Landing and at Saunders Landing the ten-fathom curve is less than two hundred yards from shore, and the kelp line marks it quite well. North of Saunders Landing the ten-fathom line again stretches off shore for seven-eighths of a mile, and is well marked by the kelp line. Inside this is broken ground, Saunders Reef and breakers to mark it. The twenty-fathom curve lies only three or four hundred yards outside the outermost points of the kelp just mentioned, and from two-thirds to one mile off shore. The thirty-fathom line is one and one-quarter miles from shore, and the forty-fathom two miles, with bottom decreasing regularly.

Saunders Reef.—For one and one-sixth miles westward from Iverson Point there lies a large kelp field about half a mile broad off the coast-line. The outline of this field marks quite regularly the ten-fathom limit of the reef. All the ground inside the reef is foul and rocky, and always marked by breakers within the three-fathom limits. There is a cluster of rocks visible at low water three hundred yards eastward of the outer breakers. There are four large rocks that show at low tide when there is a swell on, and one that shows at half tide. The rocks along shore, and very probably these rocks awash, are covered with a growth of stiff arborescent kelp about two or three feet high. The extent of the visible rocks is about one hundred and seventy-five yards.

Schooners compelled to leave Saunders Landing in southerly weather have run through this kelp field and inside the reef, but a *sunken pinnacle rock* is reported about one-third the distance from the inner edge of the breakers to the shore. This pinnacle rock has not yet been located.

From the indications of the hydrographic survey it is not unlikely that the line of this reef extends southward nearly to Sail Rock, with an opening through to Iverson Point; and, as we have already said, breakers are seen in the kelp field one half to two-thirds of a mile southeast by south half south (SE. by S. ½ S.) from Iverson Point.

The coasting steamer *Ferndale* ran on Saunders Reef in July, 1883, after entering the kelp field from the northward.

Saunders Reef Whistling Buoy.—In February, 1889, a *whistling buoy* was placed in sixteen fathoms of water about one-third of a mile south of the outer breaker of Saunders Reef, and one-quarter of a mile outside the kelp field.

The buoy lies a little more than three-quarters of a mile west from Saunders Landing, and one and two-thirds miles west by north one-quarter north (W. by N. ¼ N.). It is seven and one-third miles southeast from the Point Arena Light-house.

Although the field of kelp extends from the reef into seven and eight fathoms of water, vessels are advised not to pass inside of the buoy except in clear weather.

Arena Cove.—Two and a half miles southeastwardly from Point Arena Light-house, a short, deep, contracted valley, parallel with the coast-line, opens from the southeast upon the high cliff shores of a small cove where there is an anchorage for small vessels, moderately well protected from the northwest swell but open to the southwest. From the mouth of this valley, which is in the deepest part of the cove, the trend of the high, rocky shores is west for seven-eighths of a mile, and south by west (S. by W.) for one-quarter of a mile. The table cliff of the south point is two hundred and fifteen feet high, and the western bluff slopes quite gradually from two hundred to twenty five feet. The south shore has a shingle beach; the west shore is rocky for one hundred yards from the base of the bluff, with outlying rocks for three hundred yards.

Two hundred and eighty yards west southwest (WSW.) from the south point of the cove lie *two sunken rocks* having less than six feet of water upon them. The twelve-feet curve extends generally two hundred and forty yards off shore, except directly in the deepest part of the cove where it reaches the extremity of the southern wharf. The three fathom curve follows it closely, although the bottom outside that line is irregular and rocky, and anchorage in a heavy northwest swell is bad. The field of kelp outside the cove marks quite nearly the eight-fathom line of soundings, and there are no known dangers outside of it. The breakers on the reef of rocks on the north and south sides of the approaches mark the passage to the cove, so that a vessel entering can run in safely through the kelp and between the points, with the north wharf bearing northeast (NE.); on which course a depth of four fathoms can be carried to within two hundred yards of the chute. But with a very large swell coming in, it breaks clear across the channel between these ordinary breakers.

The *south point* of Arena Cove is a bright rocky cliff, two hundred and twenty feet above the sea, or more than twice as high as the cliffs towards Point Arena, and is distinctly visible fifteen miles to seaward in the afternoon when the sun is shining upon it. By it the position of Point Arena may be determined when the latter is below the horizon.

A small coasting steamer makes regular trips to this place from San Francisco, and an annual average of fifty schooners load lumber, posts, tan-bark, produce, etc.

A wharf and a chute have been built here. The wharf is on the north side of the small stream, and is about one hundred yards long and projects into fifteen feet of water, but a vessel's stern will be in nine feet of water when lying on the north side of it. The lumber chute is a very large and long structure, coming from a distance down and along the southeast face of the steep slope on the north side of the valley. It stretches out over ten feet of water, and a vessel lies with her stern under the chute. There are two heavy outer moorings lying well out in five fathoms, one being a little to the north, and the other a little to the south of the line of the wharf. Immediately to the southwest of the end of the wharf, in three fathoms, lies a breast-mooring, for the chute. Two other breast-moorings lie in the shoal water to the west of the chute. They are secured to the rocks, and the outer end of the chain is held up by a buoy. A vessel at the chute has a line to each outer mooring, to the two breast-moorings on the north side, and to the one on the south, with a quarter line to the inner end of the wharf. Three vessels of one hundred and twenty tons can lie in the cove in summer, and two of one hundred tons in winter. In getting under way a vessel hauls close to the northwest outer mooring-buoy and makes sail. The ordinary summer wind draws over the point so that it is fair from this buoy. Schooners load both at the wharf and chute. Lumber only is shipped from the chute. The Garcia Mills, on the Garcia Creek,

cut sixty thousand feet daily, but do not run in winter, although there is always sufficient lumber for winter shipping in smooth weather. The average amount of freight from San Francisco is sixty or seventy tons weekly.

The town of Arena lies one mile up the valley to the east and is quite a thriving place. In the vicinity are lumber mills, a shingle-mill, paper-mill, and tanneries, besides numerous farms and stock ranches. It is in the line of mail and telegraph communication north and south.

The terraced land about Arena Cove reaches over two hundred feet in elevation, and whilst the cliffs for miles exhibit every contortion of stratification, and every degree of hardness of the layers, the horizontal surfaces appear as level as if planed off.

The secondary astronomical station of the U. S. Coast and Geodetic Survey was seventy yards northwest of a small gulch opening on the edge of the cliffs at the westernmost extremity of the cove, and about three-quarters of a mile from the chute. Its geographical position is:

Latitude	38° 55′ 10″
Longitude	123 43′ 32″
Or, in time	8h 14m 54s

Hydrography.—From Saunders Reef northwestward, the outer edge of the kelp line is very uniformly half a mile from shore along the line of eight or nine fathoms, with irregular bottom inside. The ten-fathom line of soundings is half a mile from shore, the twenty-fathom line three-quarters of a mile, the thirty-fathom line one and a half, and the forty-fathom line two and a half miles from shore, with quite regular increase of depth. No character of bottom is given in the sheets consulted. Off the point west of Arena Cove the ten-fathom line of soundings projects out fully half a mile from shore and one-quarter of a mile beyond the limit of kelp, of which two patches only lie in ten and a half fathoms, and on the inner edge of this almost detached rocky shoal of about eight to nine fathoms. This presses the twenty-fathom line out somewhat, but the thirty-fathom line is nearer than usual, being only one mile from the point. The kelp hence to Point Arena is in six fathoms close inshore, and broken towards Point Arena.

POINT ARENA.

This is the first notable point of the coast north of Point Reyes, from which it bears north fifty-one and a half degrees west (N. 51½° W.) distant sixty-six miles. Approached either from the northwest or southeast it presents a long, level plateau stretching out about two miles west of the mountains, and terminating in cliffs. The plateau falls from two hundred and fifteen feet above the sea to sixty feet near the extremity of the point, which is treeless for nearly one mile back, and marked at its extremity by the Light-house and its buildings.

From the Light-house the coast-line, two and a half miles hence southeast by south (SE. by S. ½ S.) to the west point of Arena Cove, is composed of broken and precipitous cliffs of fifty or sixty feet elevation, bordered by a very rocky base, and broken by two or three small gulches. At one and a quarter miles southeast from the point and about three hundred yards from the shore, with which it is connected by a reef of rocks, lies a rocky islet of thirty feet elevation with jagged, outlying rocks formerly much frequented by the largest sea-lions; these rocks and the islet are locally known as Sea Lion Rocks.

When Point Arena is seen from the west and southwest, and the cliffs of Arena Cove are seen from the southeast, with the sun shining upon them, it shows remarkably white for the length of three or four miles. In fact no headland or point on the coast presents such a bright appearance or such uniformly vertical cliffs which are composed of hard rocks twisted and distorted into many plications.

When about a mile broad off Point Arena the outer Fish Rock, fourteen miles distant, just west of Havens Anchorage, and one hundred and fifty-three feet high, shows as a high, sharp pinnacle rock on the horizon to the southeastward, apparently well out from the shore with some rocky islets inside; and the breakers on Saunders Reef, distant seven miles, are seen at the same time outside of the Fish Rock. In the latitude of Point Arena, Arrowsmith's chart of 1798 has "Pinnacle Rock." As there is no rock of this character at Point Arena, it is barely possible reference is made to this sharp-pointed rock seen to the southward when abreast of Point Arena.

The broken and bluff character of the point is continued half a mile around to the east-northeast, where the Garcia River enters, and a long line of sand beach and dunes begins and runs to the northward for about four miles.

Point Arena Light-house, N. by W. ¾ W., 3 mi E., 1¼ miles.

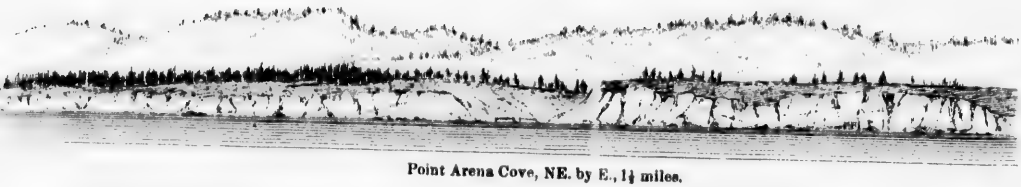
t Arena Light-house, N. by W. ¼ W., 3 miles.

Reef.

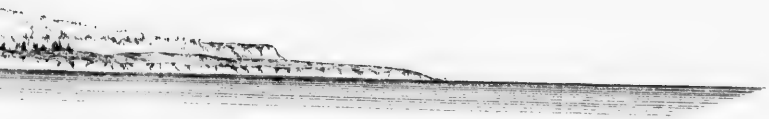
Point Arena Light-house, NE. by N., 1¼ miles.

Garcia River.

Point Arena Light house,
E. by S. ¼ S., 2¼ miles.



Point Arena Cove, NE. by E., 1¼ miles.



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Hydrography.—Bold water is found close in on the south, southwest, and west sides of Point Arena, the ten-fathom curve being within three hundred and fifty yards of the cliffs, and one hundred and seventy-five yards outside the rocky outlying ledge. The twenty-fathom curve is less than half a mile from the Light house; the thirty-fathom line one and a half miles; and the forty fathom line at two and one-quarter miles.

Dangers.—Stretching out four hundred yards beyond the point towards the northwest by west (NW. by W.), and on the prolongation of the southwest face of the cliff are jagged rocks above water, with sunken rocks, foul bottom, and breakers among the kelp for three-quarters of a mile to the northwest half west (NW. ½ W.) from the Light-house; whilst a single *sunken rock and kelp* lies one and one-third miles north thirty-four degrees west (N. 34° W.) from the Light. This rock has thirteen feet of water upon it and is very rarely without a breaker. Vancouver noticed it in October, 1793. Between this breaker and the patch of kelp and the breakers towards the point, there is a depth of fifteen fathoms over quite regular bottom.

To the northward of the point the soundings are quite regular, but the ten-fathom line is over half a mile off shore, the twenty-fathom line one and a half, and the thirty fathom line two and three-quarters miles off shore.

Off-shore Soundings.—The U. S. steamer *Tuscarora* obtained, November 1 and 2, 1873, several off shore soundings abreast of Point Arena, which are given in the following table:

Miles and bearings from Point Arena.	Depth (fathoms).	Latitude.	Longitude.	Temperature of water (Fahrenheit).	Character of bottom.
Miles.		° ′	° ′		
14 S. 85 W	127	39 00	124 00	.....	Black sand.
20 S. 86½ W	423	39 02	124 09	.....	Do.
44 S. 82 W	1,832	39 04	124 40	.....	Clay ooze
71 S. 78 W	1,984	39 05	125 14	34.6	Do.
82 S. 78 W	2,006	39 06	125 27	34.5	Do.

These few soundings off Point Arena to a depth of one hundred and twenty-five fathoms indicate that there may be a narrow plateau off this vicinity. Such plateaus are very rare along the coast, and are of great value as fishing grounds.

Maurelle says that when he was sixty miles off the coast, in latitude 39°, he "saw many sea-wolves, ducks, and fish;" but in view of the great depth developed at that distance from Point Arena it is improbable that any shoal exists in this locality.

Current.—The direction and comparative strength of the current past the point is well shown by the drag of the kelp. In October, 1877, we judged it to be running at the rate of not less than two miles per hour to the southward. In July, 1853, the computed distances between the astronomical positions, compared with the indications of Massey's patent log, showed a current from one to two miles per hour to the southward along the coast. On the other hand we are informed that navigators have found the eddy coast current moving to the northward, especially after days of calm weather.

The Landfall.—One of the landfalls for Point Arena is the high mountain range ten miles to the southeastward; or the yet higher mountains nearly northeast of it, culminating in Coldspring Mountain, twenty-seven hundred and forty-eight feet high, in latitude 39° 01′ 12″ north, longitude 123° 41′ 12″ west. This mountain is eleven miles north fifty-two degrees east (N. 52° E.) from Point Arena Light. Its summit is covered with dark chemisal, and its flanks are timbered

POINT ARENA LIGHT-HOUSE.

The projection of Point Arena for three hundred and fifty yards averages one hundred yards in breadth, and the Light-house stands one hundred and seventy-five yards from the extremity. It is a tower is the frustum of a cone, one hundred feet in height, built of brick and whitewashed. The lantern, the gallery, balustrade, and band are painted black. The illuminating apparatus is of the first order of the system of Fresnel, was first exhibited May 1, 1870, and shows from sunset to sunrise a *fixed white light* throughout the horizon. The base of the tower is fifty-six feet above the mean level of the sea, and the focal plane of the light is one hundred and fifty-

six feet above the sea. In favorable conditions of the atmosphere the Light should be visible from a height of—

10 feet at a distance of 18.0 miles.
20 feet at a distance of 19.5 miles.
30 feet at a distance of 20.6 miles.
60 feet at a distance of 23.2 miles.

It is visible off all the small harbors hence to Point Cabrillo, if within distance range.

There is a large, white stone dwelling twenty yards southeast of the Light house, and four hundred and fifty yards southeastward along the cliff is a wind-mill and tank for supplying water to the steam fog-signal apparatus.

The geographical position of the Light house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	38° 57′ 11″	north.
Longitude	123 44 24	west.
Or, in time	8h 14m 57s.6	

The magnetic variation was 17° 12′ east in January, 1885, with a yearly increase of 0′.6.

The bearings and distances of prominent objects from the Light-house are as follows:

Point Cabrillo	N. 27° W.	23⅛ miles.
Punta Gorda	N. 3° W.	85¼ miles.
Cape Mendocino Light-house is 11 mile	N. 5° W. from Punta Gorda.	
Point Reyes Light-house	S. 51¼ E.	66 miles.
Bodega Head	S. 62½ E.	51 miles.

FOG-SIGNAL AT POINT ARENA.

Seventy yards north seventy-two degrees west (N. 72° W.) from the Light-house is a low, light buff colored building for the fog-signal. The apparatus is a twelve inch steam-whistle giving *blasts of five seconds* with *intervals of twenty five seconds* during thick and foggy weather, night and day.

The "blow-hole" lies between this building and the extremity of the point. This is a great hole thirty yards in extent, and connected with the sea by an arch.

Point Arena is considered one of the most beautiful examples of the coast terraces or plateaus sculptured by the action of ice. The stratification is almost perpendicular, and exhibits the very jagged condition of the cliff and low-water level arising from the action of water and weather. This point is a jutting out from the mountain chain where the coast makes a slight change of direction, and the terrace forming the point is about forty feet above the sea and covered with a very thin stratum of soil. For a distance of half a mile the Coast and Geodetic Survey measured a base-line with a difference of level of only two feet, while the same level is maintained further on the plateau among the pine trees. The surface of the rock appears to have been absolutely planed off, and the different degrees of hardness of the layers in stratification had no apparent influence upon the mechanical forces at work.*

This point, or the high mountains immediately south, or those behind it, was first seen by Cabrillo when he was driven off the coast in the latitude of Fort Ross in November, 1542; and on the second voyage, when Ferrelo was off the Cabo de Pinos (Northwest Cape) in 1543, he "saw a point forming the extremity of the land which turned the coast to the northwest." He gave no name to the point. Vizcaino does not mention it, and his chart has a very straight coast-line from Bodega to Mendocino. About latitude 39° he notes "forests" on the chart.

The appearance of this and other parts of the coast, and especially that in Drake's Bay, induced Sir Francis Drake to call the land by the general name of New Albion, whilst the same appearance, and the sandy line to the northward of Point Arena, prompted the later Spanish navigators to designate it La Punta de Arena, a name retained by Vancouver. This white cliff point suggests an inquiry concerning the numerous Cape Blancos that are found in the Spanish voyages and charts through several degrees of latitude.

Cabrera Bueno, in his Coast Pilot, 1734, says that in latitude 39½° the land is of moderate height, with some bare hills bordering the sea-shore, which form a low point of white cliffs scarped down to the water. Hence the coast trends southeast one-quarter south (SE. ¼ S.), etc. He gives no name to this point, which is evidently Point Arena. In Miguel Constanzó's chart of 1770 he calls this point Punta de Barrancas, evidently from the description of Cabrera Bueno in 1734.

*Abrasions on the Northwest Coast of America and the supposed Ancient Sea Levels. Paper read before the National Academy of Sciences, Washington, April, 1878.

COAST-LINE BETWEEN POINT ARENA AND CAPE MENDOCINO.

The coast from Point Arena northward continues much of the same character as that from Bodega Head for forty miles to Ten-Mile River, being generally rugged, with high, bold cliffs, bordered by innumerable rocks, cut by small streams, and backed by forests rising to mountain-tops of two thousand feet elevation within two or three miles from the sea.

Northward of Ten-Mile River the character of the shores changes completely. In ten miles the cliffs give place to steep slopes coming directly from the mountains, and the shores are bordered by fewer rocks. The coast-line retreats in a bend thirteen miles to the eastward, and again gradually works out to the westward at Punta Gorda and Cape Mendocino. A great coast barrier of mountains commences from about Cape Vizcaino, and continues northwestward to Cape Mendocino, only broken by short streams from its flanks, except north of Punta Gorda, where the Mattole River breaks through. The course of this river to the northwestward lies parallel with the coast-line and only five miles inside of it, and this great mountain barrier stretches between them, culminating in *King Peak*, a bold mountain reaching four thousand two hundred and sixty-five feet elevation, and only two and a half miles from the shore. These mountains will be more particularly referred to hereafter.

In the southern half of the stretch of coast from Point Arena to Cape Mendocino, which is not so mountainous as the northern half, and where the forests reach almost to the shore line, the manufacture of lumber is the chief industry; and there are numerous coves and anchorages whence lumber is shipped to San Francisco and the southern coast, and even direct to foreign ports. The vessels trading to these ports are generally larger than those frequenting the anchorages south of Point Arena, although the character of the landings is the same, unprotected from swell and all winds except from the northwest. To meet these conditions, there has sprung up in the last few years a new class of vessels with auxiliary steam engines which combine the carrying capacity of the ordinary lumber schooner with the comparative safety of a steamer in these open and rocky ports, and these "steam-schooners," as they are called, trade principally to the ports north of Point Arena.

Kelp.—The kelp along the coast from Point Arena to Point Gorda grows rapidly during the summer, and before October it becomes very compact at the surface of the water. It is found in water as deep as twenty fathoms.

In the summer months it grows on shoal spots as well as in deep water, and the heavy northwest swell does not tear away much of it; but during the winter gales, when the heavy southwest swell prevails, the larger part of it is torn adrift; and whole fields are sometimes swept away. Frequently the top is torn off and the stems can be seen under the surface of the water.

The two years' experience of the Coast Survey steamer indicated that kelp does not necessarily mark dangers. In the early spring the vessel ran through kelp on the open coast, because it was evident that, except under headlands, the kelp could not withstand the southwest swell when it was rooted to rocks that are dangerous to navigation.

DETAILED DESCRIPTION OF THE SHORES NORTHWARD FROM POINT ARENA.

Garcia River.—This is a small stream, one hundred yards in width, opening by a very narrow mouth seven hundred yards east by north half north (E. by N. ½ N.) from Point Arena Lighthouse; it comes for two or three miles through a low, flat valley, three-quarters of a mile wide, occupied and bordered by farms. The Garcia Mill flume comes down the left or south side of the valley, bringing the lumber seven miles in the flume, and at the village of Flumesville, one and a half miles from the sea, the water from the flume is utilized to put in motion a series of rollers upon which the lumber is carried up the incline from the valley to the plateau one hundred and twenty feet above, whence it is taken by rail to the Arena Cove chute.

The shore-line northward of the Garcia River is a long continuous stretch of low sand beach, backed by sand dunes eighty feet high, drifted in lines to the southeast for more than half a mile. This sand beach runs almost exactly north for four and a half miles, broken through by Brush and Alder Creeks.

Brush Creek is a small stream entering the sea one and three-quarters miles northward of the Garcia River. The adjacent country is comparatively low.

Alder Creek is an inconsiderable stream entering the sea three and a half miles from Garcia River, with bluff banks one hundred and twelve feet on the south and rising higher on the north,

where the bluff reaches two hundred feet elevation but is bordered by a sand beach; the higher hills approach nearer the shore.

Irish Gulch lies four and two thirds miles north thirteen degrees east (N. 13° E.) from Point Arena Light-house. The sand beach ends here, and hence to the northward recommence the bold cliffs and the rocky coast-line.

Mal Paso is a very steep banked gulch two hundred and eighty feet deep and difficult for the passage of teams. It is five and a quarter miles north ten degrees east (N. 10° E.) from Point Arena Light-house. The bluffs to the northwest and to the southeast rise steeply from the water to two hundred and eighty feet. The north point of the indentation forms the south point of New Haven Landing.

A patch of kelp begins off this place in three to eight fathoms with sunken rocks and foul ground at the southern end. The patch is half a mile long to the northwest.

New Haven Landing.—The southern point of the very slight indentation forming this landing is the north point of the little cove into which empty the waters of Mal Passo Gulch. It is about one hundred and eighty feet high, with ragged shore outline, and surrounded by rocks extending as far as two hundred yards outside its extremity. It lies five and a half miles north seven degrees east (N. 7° E.) from the Light-house at Point Arena. The next point to the northwest is only four hundred yards distant, and is bordered by very many rocks that reach out two hundred and sixty yards to the west southwest, with others stretching southward within two hundred yards of the southern point of the cove; these latter rocks show at low water. The cliffs on the southeast side of the cove are over two hundred feet above the sea. The north cliff is one hundred and forty feet high.

The rocks and the sunken reefs showing at low tide nearly fill this little cove, so that there is a passage-way in to the landing not over seventy yards wide between the lines of breakers. When the swell is heavy, breakers show across the whole passage, but leave the water moderately smooth at the chute. The place is reported safe for vessels of eighty tons, one at a time. Outside the entrance there is a large mooring-buoy.

From the high northern bank a chute has been projected south-southeastward over the rocks for seventy-five yards just beyond the breakers. A vessel lies to six mooring-lines broadside to the end of the chute and heading outwards. The breakers are very close inside and to the westward of her. The reefs lie just inside the line of breakers to the east, south, and southwest, most of the rocks showing at low tide. It is a dangerous-looking place.

Bridgeport Landing.—Six and two thirds miles north one degree east (N. 1° E.) from Point Arena Light is an open, exposed landing, directly facing the northwest swell and wind, with two rocks, one hundred and twenty yards apart, outside of it. The northern rock lies one hundred yards west of the chute, and the southern one lies one hundred and ten yards south of the same. From the northern rock foul bottom runs in a narrow line two hundred and seventy yards to the northwest among the kelp, which forms a small patch with from three to eight fathoms of water. South of the southern rock is another small patch of kelp with from seven to three fathoms, with sunken rocks on the shore side of the field.

The chute is built from the high land one hundred yards inside the top of the cliffs, and passes over the water by trestle work to two small rocks lying nearly one hundred yards from the shore; thence by the apron of the chute turned sharply to the southward the produce is run to the vessel moored below close to the rocks. Double tracks are laid on the chute and the cars are moved by wire rope. The freight was mostly potatoes; but there is a saw mill one quarter of a mile up the gulch having a capacity of twenty thousand feet of lumber per day, and about fifteen vessels annually load with lumber, posts, wood, tan bark, etc.

It is a bad place to lie at, although there are four good moorings. Vessels visit it only in July, August, and September, and they charge higher freights than from any other landing.

The plateau above the cliffs runs about half a mile inland, then the hills ascend rapidly thirteen hundred feet within another half mile to the forest line, which rises to eighteen hundred and twenty-five feet at two miles from the shore.

One and a half miles northwestward of Bridgeport Chute is *Red Bluff*, two hundred and ten feet above the sea; and one and a quarter miles above Red Bluff there is a *rocky inlet*, one hundred yards in extent and ninety-three feet high, that stands half a mile off shore; it marks the position of Elk Creek, two-thirds of a mile northeast by north (NE. by N.) from it. There is a small rock two hundred yards to the south of this one. The ten-fathom curve passes close around the

outside of these rocks. The geographical position of the larger islet is latitude 39° 05′ 40″ north, longitude 123° 43′ 01″ west.

Uncle Abe's Landing is another exposed place whence are shipped lumber, shingles, posts, ties, fire wood, tan-bark, etc. It is nine and a half miles north ten degrees west (N. 10° W.) from Point Arena Light-house, and five-sixths of a mile exactly north of Elk Creek Islet, just mentioned. Elk Creek empties out one-third of a mile southeast from the landing, and has a short sand beach between high cliffs. Three hundred yards outside the beach is a rocky islet seventy feet high and sixty yards in extent. It has five fathoms of water close outside of it, but very dangerous ground inside.

At the landing a narrow, projecting point of the cliff stretches out to the southwest one hundred yards and is one hundred and seventy seven feet above the sea. For two hundred and fifty yards to the southwest and west lie great rocks, and immediately off the southeast part of the point are small rocky tops. Between these two sets of rocks there is a space of only eighty five yards. The chute runs boldly off the extremity of the point of cliff between these rocks in a southwest direction, and is very poorly protected by the field of rocks close on the northwest. The end of the chute is one hundred and forty feet from the cliff over sixteen feet of water, and the three-fathom line lies fifty yards outside. A mooring-buoy lies in seven fathoms of water two hundred and forty yards south by west half west (S. by W. ½ W.) from the end of the chute, and southeast two-thirds south (SE. ⅔ S.) two hundred yards from the outermost rock. Another outer mooring-buoy has been added one hundred yards to the eastward of the former, and two breast-line buoys are fastened to the rocks on either side of the chute. Only one vessel loaded here in 1883 and seven in 1882 on account of the small demand for ties, etc.

There was a chute one-third of a mile northwest of Uncle Abe's Landing, but it has been torn down and the landing abandoned.

Greenwood Creek Landing.—This place is one and a half miles to the northwestward of Uncle Abe's Landing, and three quarters of a mile southeast from Cuffeys Cove. The outermost rock which marks it is ten and three-fifths miles north thirteen and a half degrees west (N. 13½° W.) from Point Arena Light-house. The landing is not at Greenwood Creek, which opens upon the shore to leeward of three great rocky islets stretching out over one-third of a mile west by south (W. by S.) from a one hundred and forty feet high cliff of the shore, but to the northward of this line of islets. The outermost of these three rocky islets is one hundred and eighty yards long east and west and ninety-two feet high, with a precipitous face to the north. Its outer point lies five-sixths of a mile south sixty-five degrees east (S. 65° E.) from Cove Rock at Cuffeys Cove. For sixty yards west of this outer rock there are rocks above water. These three rocky islets and the point inside form a lee against southwest swells, and a long wharf has been projected from the high cliff point over several low rocks to the north side of the inner islet, which is one hundred and twenty-seven feet high and one hundred and seventy yards in extent. The point is one hundred and forty feet high, and the wharf is projected from it in a westerly direction over the rocks towards the first high islet, sweeps under its north side and then stretches out to the north, the chute reaching to ten feet of water, where a vessel would lie broadside on with her head out to the westward.

This little basin is not over two hundred and fifty yards in extent, with ten to twenty feet of water in it. There is a depth of eighteen feet between the chute and the reef lying barely two cables yards to the northwest of it. Outside of this the depth increases to nine and ten fathoms on the line of the islets. The nearest break to the northwest lies nearly six hundred yards beyond the outer islet.

Danger.—In approaching the cove from the southward a visible rock fifty yards in extent lies one third of a mile south twenty degrees west (S. 20° W.) from the outer islet. It is locally known as Mile Rock, being very nearly that distance south forty-three degrees east (S. 43° E.) from Cove Rock off Cuffeys Cove. A *sunken rock*, with only one foot of water upon it, lies three-eighths of a mile south thirty-five degrees east (S. 35° E.) from Mile Rock, half a mile off shore, and a little over five-eighths of a mile south ten degrees east (S. 10° E.) from the outer point of the rocky islets off the Greenwood Chute. It has twelve fathoms close around it on the north, west, and south, but a *fourteen-feet rock* lies fifty yards to the west-northwest (WNW.). There is a depth of ten fathoms close to the eastward of the latter danger.

The railroad comes down the right or northern bank of Greenwood Creek, bringing lumber to this chute and also to Cuffeys Cove. Schooners with auxiliary steam-power load at the Greenwood Creek chute.

Cuffeys Cove.—This small but moderately good northwest anchorage for small coasting schooners lies eleven miles north seventeen degrees west (N. 17° W.) from Point Arena Light-house. The Coast Survey station is in latitude 39° 08′ 27″ north, and longitude 123° 43′ 58″ west. It is a very small, irregular cove, broad open to the south, and formed by two or three narrow, projecting tongues of high bluff on the west and a receding of the shore to the north and east for four hundred yards. Outlying rocks on the west partially break the force of the northwest swell, whilst foul ground and rocks on the south of the approaches contract the deep water basin. The three-fathom curve runs well into the cove for five hundred yards to the eastward of the outer tongue of the cliff, and the ten-fathom curve comes almost to the cove; the forty-fathom curve is two miles off shore.

The outer point of the cliff, or the western end of the northern tongue of land, is one hundred and forty feet high; four hundred and fifty yards west by south (W. by S.) from its extremity lies *Cove Rock*, a notable rocky islet about fifty yards in extent and forty-six feet high. It is the outermost visible rock, and is locally used as a landmark to recognize the anchorage when approaching it in foggy weather. Cove Rock is the southernmost visible rock of a line of rocks which stretches six hundred and fifty yards to the north by west from it, and parallel to the directions of the projecting tongues of land forming the cove. The three-fathom curve lies close under these rocks, and the ten-fathom curve only sixty yards outside, except at some of the dangers to be referred to.

Dangers.—Immediately outside of Cove Rock lies a close *cluster of sunken rocks* one hundred and fifty yards south from the southern part of the rock, and having eight fathoms of water close around them.

One hundred yards southwest (SW.) from Cove Rock is *a five and one-quarter fathom rock* with seventeen fathoms close around it.

An almost *constant breaker* marks a six and a half foot sunken *rock* lying north fifty-nine degrees west (N. 59° W.) distant four hundred and thirty yards from Cove Rock. It is two hundred and fifty yards westward of the middle part of the chain of rocks running north by west from Cove Rock.

There is a low rock, thirty-five yards in extent, lying one hundred and twenty-five yards south southwest (SSW.) from the outer point of the approaches to the anchorage, and four hundred and twenty-five yards south seventy-five degrees east from Cove Rock. It has foul ground inside of it, but five fathoms close on its west side and twelve fathoms close under its southeast side.

A *sunken rock* with only two feet of water upon it lies one hundred and sixty yards south seventy-eight degrees east (S. 78° E.) from the westernmost point or tongue of the cove, and one hundred yards south thirty-eight degrees west (S. 38° W.) from the eastern tongue. It is in the direct passage-way to the wharf built out from the western face of the eastern tongue, but has eight fathoms and more close around it, and vessels pass it on either side. This danger is marked by kelp.

The foregoing dangers are all on the north side of the channel-way into the cove. On the southern side are the following dangers:

The outer edge of a patch of *foul ground*, having depths from eighteen to two and a half feet upon it, lies east-southeast (ESE.) three eighths of a mile from Cove Rock, and south by east (S. by E.) from the church spire. It lies three hundred yards south from the eastern long tongue on which the wharf is built. This ledge is about one hundred and fifty yards in extent east and west by fifty yards north and south; the northernmost rock, midway on the ledge, uncovers at extreme low tides. There is deep water around this ledge, but in beating up to it in northwest weather a *fourteen-feet rock* lying two hundred and sixty yards southeast (SE.) from its westerly extremity, must be avoided. This fourteen foot rock has eight fathoms close around it.

One hundred and twenty yards east of this ledge is a low rock about twenty yards in extent with foul ground hence to the shore.

The channel to the inner cove and to the three chutes lies between the two lines of dangers above described, but in approaching the cove from the southward, or leaving it with a northwest wind, there are two other dangers which must be avoided.

The first is a *sunken rock* lying half a mile off shore south of Greenwood Creek. It is three eighths of a mile south thirty five degrees east (S. 35° E.) from Mile Rock, and a little over three eighths of a mile south ten degrees east (S. 10° E.) from the outer point of the Greenwood Creek islets. It has twelve fathoms close around it on the north, west, and south, but fifty yards to the

west-northwest (WNW.) there is another *sunken rock* with fourteen feet of water upon it and ten fathoms to the eastward.

The passage to the Wharf.—Vessels can enter this outer cove by passing close under the south side of the visible rocks which are just outside the western tongue, carrying ten to six fathoms of water but avoiding the *two-feet sunken rock* already described as lying in the entrance. The spire of the church kept open to the westward of north by west (N. by W.) will clear this rock.

The passage to the Chutes.—Vessels enter from the westward between the north side dangers and the south side ledge. This passage is only two hundred yards in width and its general direction is northeast by east (NE. by E.), carrying ten fathoms of water nearly up to the outer mid-channel buoy, from which the church-spire bears north one-quarter east (N. ¼ E.). From this buoy the course up to the chutes is northeast by east half east (NE. by E. ½ E.) for one-sixth of a mile.

A steam-schooner might run in on the eastern side of the south ledge through an opening one hundred and twenty yards wide with five to nine fathoms, with the church-spire bearing north by west (N. by W.); but it is a risky undertaking. She could more safely come out by this opening.

The spire of the church in the village is a good landmark in fair weather.

In the cove there is room for four or five vessels of three hundred tons if the moorings are in order. In winter two vessels of two hundred tons can lie here. The harbor can be used with comparative safety throughout the year; but in 1885 the chutes were reported damaged. There is hardly a chance for saving or repairing a vessel if she gets ashore.

The chutes are located on the west shore of the cove. They stretch out from east to southeast from the eastern face of the inner one of the three tongues of land forming the western side of the harbor. At the inner and shortest chute furthest up the cove there is a depth of ten feet of water, with the three-fathom curve seventy-five yards outside. The middle chute has thirteen feet of water under it; the three-fathom line is about fifty yards outside, but a four-feet sunken rock lies between this chute and the outer one, and nearer the former. The outer chute has twenty-four feet of water under it, and points out to the southeast.

The "half-wharf" or chute, on the west side of the three tongues of land forming the western side of the cove, stretches out southwestwardly to twenty-four feet of water, with six and a half fathoms close outside. This was intended as a landing for steamers.

Formerly there was a chute located at the islet which is half-way between this cove and Greenwood Creek Landing. It stretched from the one hundred and thirty feet cliff over the water to the islet, which is eighty-four feet above the sea.

The *village of Cuffeys Cove* contains five hundred people during the busy season. Over one hundred coasting vessels load here annually. The saw-mill is located on Greenwood Creek, about three and a half miles from the cove, and the lumber is brought hither by a railway operated by steam power. The line is located along the general line of the cliffs to the mouth of the creek, about one and one third miles to the southeast, and thence up the right bank of the stream.

Navarro River and Landing.—Following the coast from Cuffeys Cove northwestward the cliffs are two hundred feet high, very broken, bordered by great numbers of visible rocks and by some sunken ones, to the mouth of the Navarro River. The three-fathom line is close along the edge of the visible rocks and is marked on the outside by a thin fringe of kelp which has six to eight fathoms close to the outer edge. The ten fathom curve is about one-quarter or one third of a mile off shore. Two and a quarter miles northwestward from Cove Rock an irregular ledge makes out half a mile from Saddle Point in a southwest direction, with an *outer danger* of eleven feet, and an *inner* of fifteen feet, having thirteen fathoms between them and eight to ten fathoms between to the kelp line. There is twenty fathoms immediately outside the eleven-foot rock, upon which no kelp is marked. This is one of the dangers in approaching Navarro Landing from the southeastward. Saddle Point is a local name for a very slightly jutting part of the cliff, which has no prominence whatever outside the general shore-line.

The Navarro Landing is three and a quarter miles northwestward along the coast from Cuffeys Cove, and seven miles southeastward from Mendocino City. It bears north twenty-one and a half degrees west (N. 21½° W.), distant fourteen miles, from Point Arena Light-house.

Navarro Head, a station four hundred and eight feet high, on the northwest side of the river and just in from the shore, is in latitude 39° 11′ 45″ north, longitude 123° 45′ 48″ west, as determined by the U. S. Coast and Geodetic Survey.

The most prominent landmarks from Navarro Head northward are Coombs Barn with cupola at Little River Harbor; the double tank and Roman Catholic church spire at Mendocino City; the

clump of trees on the north bank of the Royo Anchorage; the natural cone of rocks on the south bank of Soldiers Harbor; the Kibesillah Hotel, and the new water-tank above Westport.

The indentation of the coast-line at Navarro River is very small, but a *patch of rocks* above water stretches out three hundred and fifty yards southwardly from the point at the west side of the river to ten fathoms, and forms a sort of lee. On the south side of the approaches there is only one small group of *sunken rocks* with nine feet of water upon them and marked by a breaker; there is a depth of ten fathoms close around them. This group lies south half east (S. ½ E.) seven hundred yards from the derrick on the end of the wharf. On the west side of the approaches lie two or three rocks above water, the southeasternmost being three hundred and fifty yards south thirty degrees east (S. 30° E.) from the derrick, and four hundred and fifty yards north thirty degrees west (N. 30° W.) from the south breaker. A depth of ten fathoms of water is found between these two obstructions. The three-fathom line is two hundred yards from the shore.

The *Navarro River* is a small stream coming in from the eastward through a channel about one hundred yards wide for the last mile. The mouth is contracted by a sand point, several hundred yards long on the south side, and reaching within twenty or thirty yards of the north bluff. Formerly, at the end of the dry season the mouth sometimes became closed by the point of sand reaching across, but when the winter rains began, the volume of water increased and forced the passage, except in December, 1877. This closure of the river occurred about four times in ten years; but since the Mill Company constructed a sort of wing-dam from the north side of the entrance to Pinnacle Rock, seventy-five yards southeastward, the scouring is effective and the river is constantly open.

The wharf stretches out from the shore just west of the mouth of the river in a south-southwest direction for two hundred and twenty yards to twelve and thirteen feet of water. It is about twenty feet above high water. Sometimes in the winter season the sand washes from the beach and round the wharf, shoaling the water; but such shoaling is only temporary. On either corner at the extremity of the wharf there is a derrick, from which chutes are suspended over the vessels while loading. Vessels are not moored to the wharf, but to moorings, so as to lie some distance from it. Sometimes they are obliged to haul out at low tide. Fifty yards outside the wharf the depth is three fathoms, and thence increases rapidly to ten fathoms at three hundred and fifty yards. Three heavy mooring-buoys are placed in from seven to eight fathoms of water in the cove. The northern buoy lies one hundred yards east of the southern rock of the group on the north side of the cove; from the end of the wharf it bears south thirteen degrees west (S. 13° W.) distant three hundred yards. The second buoy bears south nine degrees east (S. 9° E.) distant three hundred and thirty yards from the end of the wharf; and the southern buoy bears south twenty-three degrees east (S. 23° E.) distant four hundred and fifty yards from the same point. This latter buoy lies just northwest of the kelp patch in the southeast part of the cove. The first two form a bridle mooring. Vessels haul out to either of them to get under way in northwest winds, but the northern one is preferred. In southeast weather they start from the third buoy. There are five or six smaller moorings inside of these, for breast-lines, etc., while lying at the wharf. Sometimes large vessels complete their cargoes or are loaded altogether at the moorings from lighters which come out of the river, directly from the mill, at high tide. The mill is located one-quarter of a mile from the mouth of the river, and the lumber is moved to the end of the wharf over a tramway.

For small coasting schooners familiar with the details of the place, this is a moderately good summer anchorage, as the outlying rocks give some protection from the northwest swell. On the approach of southeast weather, vessels put to sea if possible, although the moorings are heavy.

On an average fifty vessels load here during the year and carry away about six million feet of lumber. The mill shuts down about November, but the stock on hand employs vessels all the year in good weather.

Off Navarro Head the ten-fathom line lies close under the rocky islets along the cliffs; the twenty-fathom line is only four hundred and fifty yards off shore; the thirty-fathom line one mile, and the fifty-fathom line two miles off shore.

Logs, and any material carried seaward from the Navarro River, are found to the northwestward, moved thither by the inshore eddy-current.

The *village of Navarro* lies a quarter of a mile inside the mouth of the river, on the south or left bank, and a fine truss-bridge is built across the river here to accommodate the ordinary land travel. The post-office and several other buildings are on the ridge on the north side of the river, and known as Navarro Ridge.

Whitesboro.—This is the landing formerly known as Salmon Creek. This stream opens at the head of a small cove facing directly to the west-northwest about one and a half miles northwestward along the coast from Navarro River, and nearly a mile south of the Albion River. *Salmon Point* is the treeless cliff, one hundred and five to two hundred feet high, where the coast-line turns suddenly to the east for one-quarter of a mile to the mouth of the creek. From the point a dangerous reef stretches four hundred and twenty five yards to the west-northwest, with two patches of visible rocks. The shore inside the point consists of rocky cliffs, bordered by low rocks and one small rocky islet forty-one feet high. From the bluffs on the west shore, the land rises to a bare hillock, four hundred and fifteen feet high, one mile southeast of the point, with low trees to the northwest. The north point of the cove, one hundred and seventy-nine feet high, is two-thirds of a mile distant from Salmon Point, and forms the southeast point of the Albion River. The head of the cove is seven hundred yards east-northeast from the point, and is only two hundred yards broad north and south. The approaches are marked by lines of breakers on the north and south sides. The outer breakers are three-quarters of a mile from the wharf, and the general course in is east southeast (ESE.).

There is a sand beach at the head of Whitesboro Cove with rocky shore to the north-northwest. Across this beach is built a wharf one hundred and sixty yards long and widening to twenty yards at the outer end, where it is thirty feet above high water. Three derricks are erected at the end of the wharf, and from each a chute is suspended to carry the lumber to the vessels while loading. There is a depth of twelve feet at the end of the wharf and under the chutes. Three heavy mooring-buoys are placed in three to five fathoms nearly across the cove about north of the southern point of the main-land, and inside the sunken rocks, which are visible at extreme low tide and lie under the south shore. Outside of these buoys, and between the outer north and south breakers that show in heavy weather, is laid a heavy mooring buoy in nine fathoms, bearing about west by north half north (W. by N. ½ N.) from the wharf. It lies about two fifths of a mile outside of the Cove buoys. Between this outer mooring and the inner buoys lies another mooring-buoy in ten and a half fathoms.

The bluff shore on the north side of the cove is guarded by numerous outlying rocks and runs in a general north northwest direction for two-thirds of a mile, forming the south point of the entrance to Albion River Cove.

Whitesboro Cove is reported to be a fair summer anchorage, and it is said to be one of the best winter anchorages because a vessel can leave it with a southerly wind if the water is smooth, or with the land breeze which is said to be frequent in winter. One hundred and thirty vessels have loaded here in one year. The lumber comes by rail from two mills; one about one quarter of a mile from the wharf, and a smaller one about eight miles further up the stream. The coasting steamer makes regular trips to this place.

The latitude of Salmon Point is 39° 12′ 47″. Two miles outside the point the depth of water is forty eight fathoms, and at one mile it is thirty-four fathoms.

Albion River.—Two miles north-northwest of Navarro Head, and sixteen and a half miles north northwest (NNW.) from Point Arena, is the rock-bound cove at the entrance to the Albion River. The river is a small stream, averaging one hundred yards in width for a mile or two, between steep banks running up to three hundred feet and moderately well wooded. It never becomes dry at the mouth, but has only eighteen inches of water on the bar at the lowest stages.

The immediate coast-line is formed of high cliffs, broken and irregular, bare of trees for half a mile back, and bordered by innumerable rocks. The south point of the approaches is the north point of Salmon Creek Cove; it is one hundred and seventy-nine feet high, bare of trees, and guarded by an outlying reef with visible rocks for four hundred and forty yards to the westward. The northwest point is a rocky islet eighty feet high, close off a point of the same elevation; both are flat and treeless. The outer extremity of the northern islet bears north forty-five degrees west (N. 45° W.) eight hundred yards from the southern point. The cove is about six hundred yards wide between the nearest projections of the points, and contracts to one hundred and thirty yards one quarter of a mile further in, where there is a slight expansion forming a small basin about two hundred and twenty yards in diameter, with cliffs one hundred and fifty feet high on the north and south, and a low point at the mouth of the river on the east. The soundings in this outer anchorage are seven to eight fathoms over irregular bottom. The channel is close under the north rocks, as there is shoal ground off the south point. The leading-in range to clear the breakers off the north point and the shoal ground off the south point, is Pinnacle Rock in range

with the saw-mill smoke-stack. Pinnacle Rock is about twenty feet high and lies close under the south shore of the cove a little outside of the mouth of the river. It is readily distinguished.

At the throat leading in to the inner cove there is a rocky islet known as the Mooring Rock, thirty feet high on the north side, around which a mooring chain is passed. Schooners enter close under the south side of this islet in five fathoms and round up to the northward to the six or seven buoys placed nearly in line east-northeast from the mooring-rock. The average depth of water at these mooring-buoys is eighteen feet. Here large schooners are loaded by means of lighters, but small schooners of about ninety tons and drawing six and a half feet of water are towed into the creek and load at the mill wharf on the right bank.

Vessels drawing eighteen feet of water have loaded at the moorings direct for foreign ports. The number of vessels is about seventy annually. The mill is near the mouth of the river, and has a capacity of forty thousand feet daily; it is in active operation about nine months in the year. A tug is employed to tow vessels and lighters in and out, and it also does duty for Big Gulch.

Henley's Chute is on the south side of the cove one hundred and eighty yards from the Mooring Rock. It projects just beyond the cliffs to eighteen feet of water, and a vessel lies broadside to it, head out, moored by five or six lines. Ties and posts are shipped from this chute.

In the outer cove under the lee of the northwest rock there is placed a large mooring-buoy; a second one is on the line between this and the Mooring Rock, and a third lies in the throat of the inner cove.

In 1853 the United States Coast Survey steamer *Active* broke her anchor in the outer cove on account of rocky bottom.

One mile outside the cove the depth of water is thirty-two fathoms; forty-four fathoms at two miles; and fifty fathoms at two and a half miles.

The village and mills are on the right bank of the river at its mouth under the one hundred and forty foot table-land.

The geographical position of the trigonometrical station on the southwest point of the cove and one hundred and seventy-nine feet above the sea was determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	39° 13′ 32″ north.
Longitude	123° 46′ 25″ west.

The magnetic variation was 17° 25′ east in January, 1885, and is annually increasing 0′.8.

The river was named in 1852 by the claimant of one of the Mexican grants which embraced this region.

Big Gulch.—This is a slight indentation four hundred yards by three hundred yards in width in the high bluff coast-line. It opens directly to the west, and lies half a mile north of the eighty-foot rocky islet which forms the northwest point of Albion River Cove. At the head of the cove there enters a small creek through a sand beach one hundred yards long. This short stream has two branches coming through gulches over three hundred feet deep, with high forested hills behind. The trees reach to the shores of the cove in places.

Between the two points of the cove there is a large, low rock eighty yards in extent directly in the entrance, with dangers and foul ground reaching from it to the south point. Between the rocky patch and the north point, the channel is about one hundred and fifty yards in width, and the greatest depth is six fathoms, while the three-fathom curve runs well up into the cove. The channel-way is straight and almost exactly east and west. Four hundred yards outside the cove and almost directly to the westward there lies a visible rock twenty yards in extent; while a *sunken rock*, with only three feet of water upon it, lies one hundred and ten yards to the southward. The visible rock lies four hundred yards south fifty-four degrees west (S. 54° W.) from the north point; nearly four hundred yards south eighty degrees west (S. 80° W.) from the visible rock between the points; and a little over half a mile north twenty-four degrees west (N. 24° W.) from the eighty-foot islet off Albion River Cove.

In the approach from the southward there is another *sunken rock* with less than six feet of water upon it; it is the outer part of foul ground stretching shoreward to the southeast by east (SE. by E.). It lies one hundred and sixty yards south twenty-seven degrees west (S. 27° W.) from the outer part of the ledge, which projects from the south point of the cove across half of the channel. This danger is eight hundred yards north seventeen degrees west (N. 17° W.) from the eighty-foot rock off Albion River. There is a passage-way between it and the sunken rock outside the cove carrying as much as six fathoms of water.

From the north limit of the sand beach at the head of the cove, where the cliff is sixty feet high, a chute has been thrown out sixty yards in a southwest by south direction; and one hundred yards west-southwest from the chute there is placed a mooring-buoy in four fathoms of water. But coasting schooners must warp out from this buoy to the outside visible rock, using a line of three hundred and fifty fathoms, and carry water from four to six fathoms; or they are towed out by the tug from Albion River.

The chute was out of repair in 1883, and only two vessels loaded there in 1882 and none in 1883. It was not among the active landings in 1885. The forests accessible to the cove are almost exhausted.

The outer visible rock off the cove is in latitude 39° 14′ 23″.

The depth of water outside the cove is ten fathoms with irregular bottom at half a mile; thirty-four fathoms at one mile, regular bottom; forty-six fathoms at two miles, character of bottom not stated.

Stillwell Point is a bold, pointed cliff, one hundred and ninety feet high, one mile northward of Big Gulch and one and one-quarter miles southward of Little River Harbor. It has a rocky islet, two hundred and fifty by eleven hundred yards in extent and one hundred and forty feet high, close on its northwest side.

Colby Reef is the name given to some sunken rocks with breakers lying off Stillwell Point. From the extremity of the rocky islet off the point, the southwest breaker lies very nearly half a mile south thirty-four degrees west (S. 34° W.); and the northern one, with six feet of water on it, lies very nearly half a mile south seventy-four degrees west (S. 74° W.) from the same point. Four hundred yards inside of the northern breaker, lies another breaker with four to nine feet of water. Between these three breakers, and on the shore side of them, there is plenty of water; seven to fifteen fathoms close to the two outer ones, and ten fathoms near the inner one. The outer breakers are on the general line of the twenty-fathom curve. At one mile from the point the depth of water is thirty-five fathoms, and at two miles forty-nine fathoms.

The latitude of the rocky islet off Stillwell Point is 39° 15′ 12″ north.

Little River Harbor.—This cove is formed by the shore-line from the south making out nearly half a mile to the west-southwest (WSW.), and then continuing its general trend to the northwestward. The western point of this indentation of the coast-line lies two miles south of Mendocino Bay, and nineteen and one-quarter miles north twenty-five degrees west (N. 25° W.) from Point Arena Light-house.

Between Navarro Head, four miles to the southward, and this place, the high, jagged coast-line is bordered by numerous rocks above water and by some sunken rocks over half a mile off shore. One-half mile west of the southwest point of Salmon Creek Cove lies one such danger (see Salmon Creek Cove or Whitesboro); and one and a half miles south southeast (SSE.) from the west point of Little River Harbor, or south fifty degrees west (S. 50° W.) nine hundred and seventy yards, and south seventy-four degrees west (S. 74° W.) nine hundred yards from Stillwell Point, lie the *two sunken rocks*, over half a mile from shore, forming part of Colby Reef. Coasting vessels, bound for Little River Harbor or elsewhere in this vicinity and working northward against the summer winds, must keep a sharp lookout for these outlying dangers, especially in thick and foggy weather.

At Little River Harbor the north shore is bluff, very irregular, broken, and bordered by rocks; its general trend is nearly east-northeast and west-southwest for about eight hundred yards. The eastern shore is bordered by a sand beach for one-third of a mile, and a small stream opens through this beach. Previous to the erection of the mill at this place, the mouth of the river closed in the dry season; but the Mill Company built a tidal reservoir about three hundred yards from the mouth of the stream, and by occasionally opening the gates the channel over the bar is kept clear. The river is about one hundred yards wide for five hundred yards. On either side of this beach the bluffs rise to about sixty feet elevation.

The northwest cliff is only sixty to one hundred feet above the sea, and the mesa behind it is treeless for more than half a mile inshore, when the land begins to rise and the ridge is pine covered. The cliffs are bordered by a compact line of visible rocks, reaching out seventy-five yards; but an outer rock, small in extent, lies three hundred yards southward from the point, with a compact field of kelp extending from the northern shore to embrace this rock. This rock is visible at all times, but the seas wash over it. *Breakers* marking sunken rocks extend seventy-five yards outside of this rock.

The southeasternmost part of the cove has high bluff shores with a beach exposed at low water and outlying rocks to the six-feet curve. The cove is protected from the westerly and southwesterly swell mainly by an extended line of low rocks above water, reaching nearly half a mile from the eastern shore, and roughly parallel with the northern shore. This line of rocks obstructs the passage into the cove, and is embraced by a field of kelp which reaches eastward over eight fathoms of water to a large rocky islet, two hundred and forty yards in extent and more than sixty feet high, lying nearly three hundred yards southwest from the southern point of the cove. The southwestern point of this reef is four hundred and seventy yards south fifty degrees east (S. 50° E.) from the outermost rock off the northwest point of the cove, and its northern extremity is six hundred yards north fifty-seven degrees east (N. 57° E.) from the same point, thus almost overlapping the rocks reaching out from the northwest point.

Between this southern field of kelp and the one surrounding the rocks off the northwest point is the passage-way to the cove. The width at the outer entrance is nearly four hundred yards between the three-fathom lines, and two hundred yards between the ten-fathom lines, with sixteen fathoms of water in the deepest part. This passage-way has a general direction north-northeast (NNE.) to the sixty-feet cliff from the northeast side of which projects the northwest chute, and which forms the inner northwest point of the harbor. The summer winds are fair for entering and leaving by this passage. North and east of this inner point of bluff is the deepest part of the indented shore-line, and when a vessel is well in the cove it seems almost land-locked. But in approaching this inner point there are *two sunken rocks* with nine and a quarter and fifteen feet of water upon them a little to the north side of mid-channel. They have four and a half to seven fathoms close around them. The nine and a quarter feet rock lies one hundred and fifty yards south twenty degrees west (S. 20° W.) from the inner point; and the fifteen-feet rock lies seventy five yards south from the same point.

The cove is reported to be a good anchorage in any wind from southeast round by the south and west to northwest, and four vessels can lie at the moorings in a storm; the danger is in entering and leaving. The cove is open only to the south-southwest, with the lines of rocks on both sides out to the entrance, which has plenty of water as above described. Vessels must keep close under the northwestern shore with a northwest wind, avoiding the sunken rocks mentioned above.

There are two chutes and a wharf in this cove. The wharf is one hundred and ten yards long, widened at the outer end, and is built out in a south-southwest direction from the cliff on the northwest side of the sand beach at the mouth of the river. There is a depth of ten feet of water at its outer end and a good beach on each side of it. The outer end of the wharf is distant one hundred and fifty yards from the end of the northwest chute, with a depth of about fifteen feet of water between them. From the eastern angle of the sixty-feet cliff forming the western side of the inner part of the cove the northwest chute has been projected towards the east-northeast over sixteen feet of water with four fathoms close outside. A vessel lies broadside on to this chute, heading southward, and moored by six lines. In the southeast part of the cove, four hundred and seventy-five yards south sixty-six degrees east (S. 66° E.) from the northwest chute, there is a new chute, sixty yards outside the forty-feet cliff and pointing towards the northwest chute, with rocks not far distant on either hand. There is twelve feet of water under this chute. Vessels lie broadside to it, heading to the south. The stern-line is carried to a chain fastened to a tree on the cliff.

There are now six mooring-buoys lying in from four to five fathoms of water southeast from the northwest chute and inside the kelp field. The farthest is more than half-way towards the southeast chute, but somewhat to the westward of the line.

In leaving this anchorage vessels must be sure before starting that there is wind enough to carry them out beyond the rocks. It frequently dies out under the north head, and vessels are in danger of drifting on the rocks south of it.

The twenty-fathom line of soundings lies only two hundred and fifty yards outside the kelp field off Little River Harbor. At one mile westward of the outer rock off the north head the depth of water is forty-two fathoms, and at two miles it is fifty-two fathoms.

The lumber loaded here is cut at the mill on the south side of the Little River, and from the second mill in Stillwell Gulch, whence it is brought by tramway to the southeast chute. The mills run only in summer, but vessels load at all seasons. On an average fifty vessels load here annually. The coasting steamers make regular trips to this place.

MENDOCINO BAY.

A broad rising table-land lies between Little River Harbor and Mendocino Bay. It is one and one-quarter miles long by three quarters of a mile wide. Its seaward face, which is broken and bordered by great numbers of low rocks, is only forty to sixty feet high. The forest begins a little more than half a mile inside the shore and at two hundred feet above the sea. The hills rise regularly behind this to one thousand and sixty-two feet elevation at Great Caspar Station, which is four miles northeast (NE.) from the town of Mendocino.

The northwest point of Mendocino Bay lies twenty-one miles north twenty-five degrees west (N. 25° W.) from Point Arena Light-house and four and one-quarter miles northwestward from Albion River. It is an irregular, broken cliff, about sixty feet high, bordered by numerous rocks. The whole area of the point is about half a mile northwest and southeast, and extends eastward nearly a mile to the forest.

The south point of the bay lies one thousand and fifty yards south thirty-three degrees east (S. 33° E.) from the northwest point. It is a ragged, irregular cliff, about one hundred feet high, bordered by many low rocks, with a short reef extending one hundred and fifty yards towards the northwest point. There are no large trees upon it, but some scrub on the northern part. Within three hundred yards back from the point it rises into a knoll one hundred and fifty-six feet above the sea.

The bay is about half a mile deep towards the east from the line joining the approaches outside the northwest and southeast points. The eastern shore is rocky, with high cliffs clothed with considerable wood. The *Rio Grande* or *Big River* enters the northeast angle of the bay, and is from one hundred to two hundred yards wide between the high, wooded banks. The mouth is always marked by breakers. There is a causeway built on piles across the stream just above the mouth. This river is never closed.

At the southeast angle of the bay is a shoal pocket with bluffs one hundred feet above the water, and the base bordered by a sand beach upon which the northwest swell rolls square on. In the entrance to the bay, midway between the northwest and southeast points, but a little outside the line joining them, there is a *shoal rocky patch* nearly two hundred yards in extent within the ten fathom line. This ledge has as little as three and a half fathoms upon it, with deep water around it except to the southeast, where a line of six fathom soundings runs to the point. The clear passage-way between the breaker on this ledge and the nearest point to the northward is one quarter of a mile in width, with depths reaching to eleven and a half fathoms of water over rocky bottom. But a shoal spot, with only eight feet of water upon it, will be found just inside the northern point when the southernmost edge of the bluff bears southwest by west (SW. by W.), distant one hundred and twenty-five yards; and the outer end of the nearest chute bears northwest by west (NW. by W.), distant about sixty yards. Close around this eight-foot spot there is over three fathoms, except for a short distance towards the chute.

Throughout the bay the bottom is hard, and in places rocky, but the depth of water is good, ranging from three fathoms close under the shores, except at the mouth of the river, to twelve fathoms across the bay in the line of the three and a half fathom breaker. Outside the heads the ten-fathom curve lies only one hundred yards off the north rocks, and one hundred and fifty yards off the south rocks; the twenty-fathom curve is less than half a mile off shore. Even at twenty fathoms the bottom is hard sand and rocky.

One mile outside the bay the depth is thirty-six fathoms, and at two miles it is fifty-three fathoms. The increase from twenty-five fathoms is quite regular.

The place is quite readily made out by the large village facing the north part of the bay; and even in coming from the northwest along the coast the church-spire and higher buildings are seen over the slightly rising ground to the north and northwest.*

There are no outlying dangers to this bay, so that vessels bound here in summer work a little to windward and then run boldly in towards the north point, keeping a short distance outside the breakers and gradually decreasing the distance to one hundred yards just off the south end of the north point in six fathoms of water; hence they run on about one hundred and fifty yards past the point to the first of the three buoys in seven and a half fathoms. It is not a comfortable

*When Mendocino was bearing east-southeast distant six or seven miles, little or nothing could be seen of the town except a church-steeple; but to the northward, and under the trees, when the church bears east distant five miles, it is on the right-hand edge of a notable square cut in the forest. The rolling land in front of the town towards the water is cleared.

place in summer, for a large swell rolls in freely; and in winter, on the approach of a southeaster, vessels formerly had to put to sea, but now there is a heavy southeast mooring for vessels to lie to in southerly weather.

Approaching vessels are notified by signals from shore as to the state of the harbor. If it is rough, or there is room for no more vessels, the flag at half mast indicates that the last comers must stay out and wait their turn. If the flag is at the mast head the vessel may come in.

There were three chutes constructed from the northeast face of the northern head, and run out to eighteen, fourteen, and thirteen feet of water, but the inner one has been abandoned and taken down. A vessel drawing, loaded, seventeen feet can lie at the outer or southeastern chute, and drawing ten feet at the inner. Deeper vessels are loaded from lighters. In summer, vessels of six hundred to eight hundred tons load here; in winter, vessels of two hundred tons only should come. They can beat out in moderate southeast weather.

One large wharf was built out from the bluff towards the mouth of the river over a rock and reaching into seventeen feet of water, but it has been entirely washed away. The coasting steamer which calls here regularly lies at the moorings and passengers are landed in boats at one of the chutes; freight is discharged in lighters and hoisted by a swinging derrick to a platform built out from the top of the cliff between the two chutes.

The moorings here are laid in a somewhat intricate manner, and a stranger coming in and dropping anchor among the buoys is liable to foul it among the heavy ground chains. A vessel should anchor to leeward of all the buoys and then run a line to some one and warp into position. There are two principal mooring-chains nearly parallel to each other stretched about southwest and northeast, and lying to the southeast of the northwest point. There are no buoys over the heavy ground-chains proper, but short chains are attached at intervals thereto, and the buoy at the end of this chain is taken on board the vessel. There are buoys on the inner ends of the heavy ground chains. Chains fastened to the rocks on the northeast shore are seventy fathoms long, and each has a buoy on the outer end for stern fastenings to the vessels. The moorings are laid in seven and a half fathoms and less.

The saw-mill is the largest hence to Humboldt Bay, and has a capacity of sixty thousand feet daily, but is shut down in the winter season. It is built on the right bank of the river, half a mile inside its mouth, and the lumber is brought to the chutes on tramways. Vessels load at the chutes and in winter sometimes from lighters. The average number of vessels loaded here each year is about seventy.

Some coasting schooners have been built in the river and brought out at high water. This harbor is known to many of the coasters as Big River Landing.

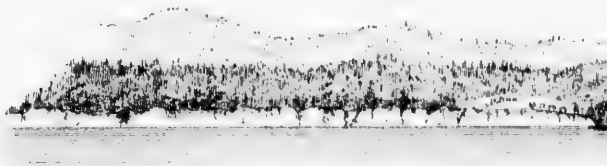
The village at this place was formerly called Meiggsville, but is now known as *Mendocino City*. It is a good-sized and thriving town and has regular communication with San Francisco and other coasting ports by steamer.

The secondary astronomical station of the U. S. Coast and Geodetic Survey is on the north head at the neck, and it has been preserved and marked with a copper plate by the Mendocino Lumber Company. Its geographical position is:

Latitude	39° 18′ 05″.3 north.
Longitude	123° 48′ 34″.5 west.
Or, in time	8h 15m 14s.3.

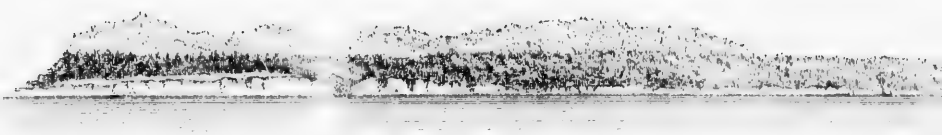
The magnetic variation was 17° 26′ east in January, 1885, and increases about 0′.8 annually.

Russian Gulch.—From the outer part of the northwest head of Mendocino Bay the course to Point Cabrillo is northwest by north (NW. by N.), and the distance three miles. Two-thirds of a mile north of the Mendocino Head the shore retreats sharply over half a mile to the northeast, and then continues roughly to the northwest. A long line of rocky islets and sunken reef stretches half a mile northwest by west (NW. by W.) from the first point of turning. In the above three-mile stretch of shore, and one and a half miles south of Point Cabrillo, there is a smaller and sharper indentation at the mouth of a small stream coming through the Russian Gulch. The entrance to this cove is two hundred and sixty yards wide; and one pocket makes to the east and another to the northeast. The stream empties into the latter. On the chart there is laid down a *sunken rock* outside and a little to the north of the middle of the entrance. It has eighteen feet of water upon it, and five fathoms on the inside and ten fathoms on the outside. The shores of both coves are broken cliffs, sixty to eighty feet high, bordered with rocks. From the sixty-feet cliff on the south side of the northeast pocket there is constructed a chute



White mark and flag.

Caspa

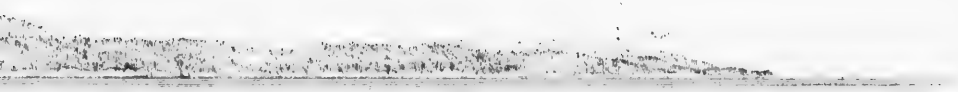


River, E.SE., 5 miles.

Point C

Point Arena Light-house, SE. ¼ E., 7 miles.

Caspar Creek, E. ¼ N., 3 miles.



Point Cabrillo.

Mill in Albion River.

Novarro Head, SE. ¼ E., 15 miles.

nt Arena Light-house, SE. ¼ E., 7 miles.

Novo

15 miles.

and another on the north side of the same pocket. This pocket, or inner cove, is only one hundred yards wide at the entrance, but it was reported to be quite a good anchorage with fair moorings. The three fathom line of soundings reaches into this inner cove, and close to the southern chute. Small schooners are said to have ridden out southeasters here; if so, the swell must be broken by the rocks and reef stretching northwestward from the Mendocino Bay Head.

The twenty-fathom curve lies less than half a mile from the north point of the entrance, and the depth increases to thirty-seven fathoms at one mile from shore and to fifty-three fathoms at two miles.

The timber in the vicinity has been all cut away and the two chutes have been abandoned (1885).

The latitude of the north point of the entrance to Russian Gulch is 39° 19′ 24″ north.

POINT CABRILLO.

This is the first point made northwestward of Point Arena, from which it lies north twenty-six degrees west (N. 26° W.) distant twenty-four miles. It presents the appearance of a flat-topped point, fifty to sixty feet high, with nearly vertical cliffs towards the ocean, bordered by low rocks for two hundred and thirty yards from the shore. It is treeless for half a mile back. From the northwestward it presents the same characteristics, and as it is approached, the points of Mendocino Bay, Little River Harbor, and Navarro Head gradually rise with somewhat similar features.

At the edge of the forest five-eighths of a mile east from the point is the small village of *Pine Grove*.

The depth of water just outside the rocks close under the point is ten fathoms, and the twenty-fathom line is only fifty yards from the rocks. At one mile to the westward of the point it is forty-seven fathoms, and at two miles it is fifty-three fathoms.

Four miles eastward of Point Cabrillo the pine-covered coast mountains rise to nearly eleven hundred feet elevation and are visible at thirty-six miles from seaward.

The geographical position of the station at the extremity of Point Cabrillo, as determined by the Coast and Geodetic Survey, is:

Latitude	39°	20′	54″ north.
Longitude	123°	49′	25″ west.
Or, in time	8h	15m	17s.7.

The magnetic variation was 17° 27′ east in January, 1885, and increases yearly 0′.8.

This point was named by the U. S. Coast Survey to commemorate the voyages of Cabrillo in 1542–'43, although he did not see the land in this vicinity.

From Point Cabrillo the coast-line trends more to the northward, and continues nearly a straight bluff for nine miles north by west (N. by W.) to Laguna Point. These points, however, are not intervisible, as the coast curves a little to the westward of the above course about midway between them. The shores are moderately high and generally wooded to the face of the cliffs. The coast-line is broken by several indentations and small streams, and is bordered by great numbers of rocks close under the cliffs; as far as known no hidden dangers exist one-third of a mile from shore.

Caspar Anchorage.—Three-quarters of a mile northward from Point Cabrillo is the southwest point of this cove, into which empties Caspar Creek. The northwest point, called Caspar Point, bears north by west half west (N. by W. ½ W.) over one third of a mile from the southwest point, and both are surrounded by numerous rocks above water. The cove opens directly to the west, and is half a mile deep from the outermost rocks to the inner beach. Its width at the entrance between and clear of the rocks is four hundred yards, decreasing to two hundred yards between the inner rocks.

From the northwest point the sunken and visible rocks stretch off nearly three hundred yards in the direction west southwest, with three fathoms of water close around them and ten fathoms of water two hundred yards outside.

To the northwest and south of the rocks off the entrance points, there are no outlying dangers.

A depth of ten fathoms of water reaches well into the cove, and three fathoms to abreast the inner rocks, or within one hundred and seventy-five yards of the beach.

There is a *sunken rock* in the harbor close under the rocks along the north shore and nearly two hundred yards west of the western chute. It has three feet of water upon it at low tide.

The average depth of water in this harbor is about seven fathoms. Vessels have room to beat out with the northwest winds, but the operation looks dangerous, although no losses have occurred on this account: there are three mooring-buoys laid to haul out by in calms or light winds. The harbor is reckoned a good one by the coasters, and vessels can load here in winter weather.

At the head of the cove, one-third of a mile from the southwest point, is the mouth of Caspar Creek, one hundred and thirty yards wide above the mill-site, but it opens through a very narrow mouth at the north end of the sand beach, which is two hundred and sixty yards long. Although it has but little water in it at any time, it closes in the dry season only about once in three years. The stream is only eight miles long, and comes from the east between very high steep banks.

Two hundred yards westward from the mouth of the creek on the north bluff there is a lumber chute, and seventy-five yards farther to the westward a second one has been built. There is a depth of eleven feet under the eastern chute; and eighteen feet at the western. There are very good moorings, and they are examined before each winter season. They are connected together somewhat after the manner of those at Mendocino City. The outer mooring-buoy lies in the entrance between the outer points of the rocks. Four vessels can lie at the moorings, and they are loaded from the chutes. There is a flag-staff, on the top of the bluff above the chutes, where a flag is hoisted at half-mast when there is no more room for vessels.

The mill, which is located three hundred yards inside the mouth of the creek on the north bank, has a capacity of fifty-five thousand feet daily, and the average number of vessels loaded here is fifty each year. The total amount of lumber shipped from here is reported at one hundred and fifty million feet. The saw-logs come by rail from four miles up the Jughandle Creek; but as the good forest trees are nearly exhausted there, the next source of supply will be Hare Creek, three and a half miles to the northwestward and just south of the Noyo River.

The *village of Caspar* is situated inside the mouth of the creek on the rising ground on the north or right bank, and has about five hundred inhabitants. A roadway on piles crosses the stream about one-quarter of a mile above the mouth. The name was formerly spelled Casper.

Electric lights are shown at this place, and they light up the underside of the low clouds and lighten up the steam from the saw-mill running at night, so that this feature is used by the masters of vessels as a characteristic for finding the harbor at night.

The latitude of the outermost part of Caspar Point is 39° 22′ 06″ north.

The twenty-fathom curve lies only two hundred yards outside the rocks off the entrance points to Caspar Anchorage; there is a depth of forty-four fathoms at one mile and fifty-five fathoms at two miles outside.

The coast immediately north of Caspar Creek is bordered by broken cliffs with a great number of rocks stretching out four hundred yards; there is no known danger outside the three fathom curve, which is close under the visible rocks. The forest generally comes down to the edges of the cliffs.

Bromley Gulch is at the mouth of a small creek one and one-quarter miles north of Caspar Point. There is hardly a perceptible indentation of the shore-line, which is high cliff bordered by numerous rocks. A poorly constructed chute was built (1884) from the south side of the very small cove at the mouth of the creek. There is no protection, plenty of rocks, and the swells fill the place. It is not supplied with good moorings and no vessel has loaded here.

Beaver Point is a low bluff point three and a half miles north twelve degrees west from Point Cabrillo. It does not project outside the general trend of the coast, but the shore recedes half a mile to the east at the mouth of Hare Creek, one mile farther north. There are plenty of rocks close under the point, and one sunken rock with breaker about one-quarter of a mile to northwest by west (NW. by W.). The trees come close to the edge of the cliffs north and south of this gulch.

Pallas Bay.—This landing at the mouth of the Hare Creek is four miles north by west (N. by W.) from Point Cabrillo and one mile south of Noyo River. The south point of Noyo projects three-quarters of a mile to the west-northwest from the mouth of Hare Creek, and affords some protection to this small indentation. The shores are rocky cliffs, moderately high, and bordered by rocks. At the head of the cove is a sand beach one hundred and seventy-five yards long, and the creek opens through the south end of it. The cove is very small and opens to the west. The chute built out from the north shore of the cove and projects over rocks to the west-southwest over

feet of water. A reef of rocks to the northwest affords some slight protection, but the place looks very rough. There are no moorings and no shipments (1885) and it is unsafe without moorings. In 1882 five cargoes of posts, ties, wood, and tan-bark were shipped hence, but none in 1883. There were some moorings still remaining in 1883, but they were not in good order.

Noyo River and Anchorage.—The south head of Noyo Anchorage is four and a half miles north thirteen degrees west (N. 13° W.) from Point Cabrillo, and seven and three-quarters miles from Mendocino Bay. The shore-line continues the same steep bluff, nearly straight, but broken by several small creeks opening to the sea. The shore is bordered by great numbers of rocks, but none lie over a quarter of a mile from the cliffs; and no hidden dangers are known except off Beaver Point, three and a half miles north by west (N. by W.) from Point Cabrillo and a little more than a mile to the southward of the south head of Noyo Anchorage, where a *sunken rock* lies one quarter of a mile northwest by west half west (NW. by W. ½ W.) from the point. The country is wooded to the edge of the cliff except around Noyo Bay, where the entire south point and a large area of the north point are free of timber.

Noyo Anchorage is a small cove opening to the west-southwest (WSW.) with moderately low mesa land and steep cliffs on the north and south that are continued inside. The two points of entrance are about a quarter of a mile apart and bear north and south from each other. There are more rocks along the south shore and point than under the north shore.

Stretching out two hundred and fifty yards to the northwest from the south point of the entrance are small visible rocks and foul bottom. This limits the width of the entrance but helps to break the force of the southwest swell. The three-fathom curve is immediately under the outermost rocks, except in two places where sunken rocks are found. The first *sunken rock*, having five feet of water upon it, lies one hundred and forty yards north sixty-four degrees west (N. 64° W.) from the westernmost point of the south head. It has a depth of four and a half fathoms of water inside of it and eight fathoms of water close outside. The second *sunken rock*, having but three feet of water upon it, lies one hundred and sixty yards to the northward of the former, and four hundred yards north forty-three degrees west (N. 43° W.) from the westernmost point of the south head. A *three fathom spot* lies one hundred yards outside the reef stretching northwest from the south head, but there is a depth of five fathoms inside of it and six and a half fathoms outside.

On the north side of the entrance the line of visible rocks lies at farthest less than three hundred yards from the southwest face of the cliffs, and close under the point at the immediate entrance.

But there are two dangers off these northern rocks. The first *sunken rock*, with less than twelve feet of water upon it, lies five hundred yards west from the north point of the entrance. It is one hundred yards outside the three-fathom curve under the visible rocks, and has a depth of seven and a quarter fathoms of water all around it. The second *sunken rock*, visible at extreme low water, lies ninety yards south by west (S. by W.) from the southernmost point of the north head, and, being abreast the outermost rocks from the south head, the channel-way is here reduced in width to two hundred yards between the three-fathom curves, but it carries six to seven fathoms of water nearly across it. This last danger is a pinnacle rock, and there is deep water close up to it on all sides except towards the east, where it slopes very little.

The harbor proper is three-eighths of a mile in length from the heads to low-water line at the river entrance, and averages one-quarter of a mile in width. The average depth in the harbor is five to six fathoms. The summer winds blow directly in, but vessels can lie at anchor with room to swing. The winter winds draw out.

The leading in range is a rock close under the high bluff on the south side of the river entrance with the gable end of a large whitewashed barn a little more than a quarter of a mile to the eastward and under the high northern bank of the river. The bearing of this range is east half north (E. ½ N.), and it will clear the sunken rocks off both points of the entrance. There is, however, a sunken rock north of mid-channel already mentioned as ninety yards from the north head. Vessels are reported sometimes entering on the north side of this breaker and carrying good water, but the passage proper is to the south of it.

Off the Noyo Anchorage the ten-fathom curve is only four hundred and twenty yards from the general line of the cliffs. At one mile the depth is thirty-two fathoms and at two miles forty-four fathoms.

The *Noyo River* is a considerable stream some forty miles long; but it is only forty yards wide at the mouth, where a low point reaches from the north towards the south side of the gulch,

and the mill settlement is on and back of this point. There is a bar outside the entrance to the river, upon which the depth averages about seven feet of water at high tide; but sometimes, when there is a good head of water in the river and plenty of logs there, this bar washes away, so that a bark drawing fourteen feet of water is said to have loaded in the river and been taken out at high tide; and the channel remains open for some time. At times the mouth of the river is almost closed, especially after a succession of strong northwest winds and large swell, but it remains so only for a short time.

There is no chute at the Noyo Anchorage. Lumber is loaded on lighters from a wharf inside the mouth of the river and then taken out to the vessels in the harbor. Small vessels generally fill their holds in the river and receive their deckloads in the harbor. Large vessels sometimes load here direct for foreign ports, and it is reported that a ship drawing twenty-three feet of water has taken a cargo of lumber hence to Valparaiso. A tug is employed to tow vessels outside the heads and clear of the rocks. The same tug does duty here and at Albion River. There are only two mooring-buoys in the harbor—one for head and the other for stern fastening.

The saw-mill was closed in 1885 on account of litigation, but in ordinary seasons five vessels load monthly.

The coasting steamer calls here every trip. She lies at the moorings and her freight and passengers are lightered off and on.

The geographical position of the Coast and Geodetic Survey station on the south head of Noyo Cove is:

Latitude	39°	25′	31″ north.
Longitude	123°	47′	32″ west.
Or, in time	8h	15m	10s.1.

One of the general landmarks for making Noyo Cove is *Bald Hill*, which lies three and one third miles north thirty one degrees east (N. 31° E.) from the north head of Noyo Harbor and rises to an elevation of eight hundred and ten feet. The seaward face of the hill is bare down to nearly one mile of the shore. The area of the grassy surface is about one square mile. The summit is in latitude 39° 28′ 00″ north, and longitude 123° 45′ 17″ west.

Just north of the Noyo the forest comes down to the cliffs for a stretch of a mile or more, enveloping the cove called Fort Bragg or Soldiers Harbor.

The Indian name for the Noyo River is Chim-la-bé-da.

Fort Bragg or Soldiers Harbor.—Two thirds of a mile northwest of the north head of Noyo Cove is a sharp cliff pointing out to the west-northwest (WNW.), and behind it to the north and east is a small indentation called Soldiers Harbor. It is about two hundred yards in diameter and regular in shape, but has very little clear space between the many rocks both at the entrance and inside. A very small stream enters it and the land is low around it. The bluff on the north side is quite low but bordered by many rocks. As a shipping place this is one of the rockiest landings on the coast. It has only a narrow entrance of one hundred and thirty yards width between the breakers, but when once well inside it is reported to be quite smooth. The general course in is northeast (NE.) The depth in the entrance is nine fathoms, and the water shoals to eight feet at the end of the wharf, which, however, was not completed in July, 1885. This wharf is projected to the west-southwest (WSW.) from the northeast part of the cove. There were no moorings laid at that time, but it was in 1886 in running order as a shipping landing. A saw mill is erected here, and a railroad has been constructed to tap the extensive forests in the interior. Steam schooners only load here. The place is now known as Fort Bragg Harbor.

Fort Bragg, laid down on some of the recent maps, no longer exists. Some of the buildings still remain about three-eighths of a mile from the head of Soldiers Harbor. It was the military post for the protection of the "Noyo Indian Reservation," but was abandoned many years ago.

Whistling Buoy.—An *automatic whistling buoy*, painted with *black and white perpendicular stripes*, has been moored in the approaches to this harbor. It lies in twenty-two fathoms of water on the line of the black spar-buoy on the north side of the entrance in range with the wharf.

The buoy is sounded by the action of the sea, and gives blasts of twenty to thirty in each minute. It was placed in position August, 1888.

The course into this small harbor is narrow but straight, and runs northeast by east (NE. by E.). Care must be taken to avoid the rock awash on the southern side of the entrance.

It is claimed that next to Little River Harbor Fort Bragg Harbor has the smoothest anchorage in southeast gales.

Pudding Creek, about two miles north of the Noyo, is a moderately large stream breaking through the cliffs, which are fringed with rocks for two hundred or three hundred yards off shore. On the north side of the mouth is a long stretch of bare sand. A very long piled roadway and truss bridge crosses this stream on the line of land travel.

About three hundred yards north of Pudding Creek a small point juts out two hundred yards, and two hundred yards outside this point lies a *sunken rock* marked by a breaker. Two other *breaks* are laid down a little inside the line hence to Laguna Point, and three hundred and seventy yards from the former break.

Virgin Creek empties nearly a mile northward of Pudding Creek and is only a few yards in width, but has a sand beach at its mouth.

Laguna Point.—The northern extremity of the nearly straight line of cliff coast from Point Cabrillo is Laguna Point, eight and a half miles north ten degrees west (N. 10° W.) from the former point. From the south point of Soldiers Harbor to Laguna Point the shore is straight, formed by low, rocky cliffs only twenty feet high, and cut by Pudding and Virgin Creeks. The distance is three miles and the general direction north one-third west (N. ⅓ W.). The forest comes within one-fifth of a mile of the shore-line. North of Laguna Point the shore trends slightly eastward and its character changes to a long, straight sand beach. Laguna Point is a small, jutting cliff thirty feet high, flat-topped, bare of trees for five hundred and fifty yards inland, and only noticed when a vessel is very close inshore. At a mile and a half behind the point the land rises to a high hill. A bare reef extends three hundred yards northwest from the extremity of the point. *Two sunken rocks*, marked by breaks, lie outside the reef; one bears north fifteen degrees west (N. 15° W.) four hundred yards from the point, and the other north thirty-five degrees west (N. 35° W.) three hundred and eighty yards. Both are less than one hundred yards outside the visible rocks. There are also several *breaks* on rocks awash. A small visible rock with a rock awash fifty yards outside of it lies south sixty-seven degrees west (S. 67° W.) three hundred and ten yards from the point, and two hundred yards outside of the other visible rocks.

The three-fathom curve reaches four hundred yards outside the point towards the northwest; and the ten-fathom curve is seven hundred yards in the same direction, being a very little outside the ten-fathom line which follows closely the general trend of the shore-line. The twenty-fathom line is three-fifths of a mile from the point; at one mile the depth is twenty-nine fathoms, and at two and a half miles it is fifty fathoms.

There is some irregularity in the depths to the west-northwestward of the point; and at one and a half miles west by north (W. by N.) from it, where the depth should be about forty fathoms, there is broken bottom with sudden changes from forty-two to twenty-four fathoms. To the northward of this bearing the fifty-fathom soundings are a mile and a half farther off shore than to the southward.

In the bight east of Laguna Point is the shipping place known as Laguna Landing.

The geographical position of the Coast and Geodetic Survey Station on Laguna Point is:

Latitude	39° 29′ 16″ north.
Longitude	123° 29′ 07″ west.

A small stream opens under the north side of Laguna Point; just inside the beach it spreads into a lagoon four hundred yards long by one hundred and fifty wide. The point derives its name from the existence of this lagoon.

Bald Hill, already described under Noyo Harbor, lies two and a half miles south sixteen degrees east (S. 16° E.) from Laguna Point, and is a landmark for making this place.

Laguna Landing.—This is a newly established shipping point in the small bight just under the east side of the reef making out from Laguna Point, already described. At the mouth of the creek, under the point, there is a space of one-quarter of a mile free from rocks, which recommence and run for a mile hence to the south end of the Ten-Mile River Beach. The three-fathom curve, following close under the line of visible rocks from the westward, does not run in towards the beach, but rather keeps further out, so that it is two hundred and fifty yards from the smooth beach eastward of the mouth of the lagoon. Within the area bounded by a line from the outermost rocks to the west off Laguna Point, and the rocks and breakers to the northward, the depth of water is nowhere over six and a half fathoms, with the ten-fathom curve lying a quarter of a mile outside the above line.

The wharf is about one hundred and sixty yards long, and projects to the north-northwest over the rocks, which are very numerous on the west side of the mouth of the lagoon. To this

wharf is attached the apron or chute proper, and a vessel lies under it in twelve feet of water. Vessels of one hundred tons do not run much risk in summer-time. They haul to the outer buoy with a northwest wind, and with a southeast wind they sail out. A sudden coming in of a southwest swell without wind makes it an uncomfortable place. Five moorings have been laid down for vessels to moor to. At the chute a vessel lies head out off the northeast angle of the wharf.

The depth of water in the approaches to this place has been mentioned under Laguna Point.

The mill is situated in Little Valley, about three miles to the eastward, and has a capacity of eighteen thousand feet. The lumber is hauled by teams to the chute. Ties, posts, bark, and wood are also shipped.

In 1886 it was reported that the wharf and chute had been washed away and that it would probably not be rebuilt, the business having been transferred to Fort Bragg Harbor.

Ten Mile River Beach.—For a mile and a half north of Laguna Point the bluff is very low, nearly straight, and bordered by sunken and visible rocks; but none lie over five hundred yards from shore, and the outermost lies eight hundred yards north northeast (NNE.) from Laguna Point. Then begins the remarkably straight line of sand beach hence to the mouth of Ten-Mile River, which bears north twelve degrees east (N. 12° E.) four and one-fifth miles from the outer rocks off Laguna Point. The beach is backed by sand dunes for over half a mile inland, where the land is from one hundred to three hundred feet in elevation; and at a mile and a quarter from the shore-line the forest begins. Bald hills show themselves among the forest, and on the north bank of Ten Mile River they rise to eight hundred and thirty feet within one and one-quarter miles of the shore. Two small ponds lie inside this beach. There are no dangers off this stretch of coast.

The three-fathom line lies a little over a quarter of a mile from the shore, and the ten-fathom line a little over half a mile. They both follow the general trend of the shore very closely, except off Ten Mile River, where the ten-fathom line is a little farther out. At one mile outside this long beach the depth of water is seventeen fathoms; at two miles it is thirty fathoms; at three miles forty-four fathoms, and at three and a half miles forty-eight fathoms.

Over this low beach and over the low country to the southward the summer winds draw in very strongly.

Ten Mile River is a short stream only fifty yards wide at the mouth, which has a low point on the south but a higher one on the north side where the land rises to eight hundred feet at one mile back. Just north of the mouth of the river is a rocky islet, seventy yards by twenty in extent and forty feet high; it is the largest in the immediate vicinity, but has not been named. The mouth of the river generally closes about July and opens about November.

On the section map of California this stream is called Beedoloc Creek. The south fork of Eel River heads behind Ten Mile River, only seven miles from the coast-line.

Ten Mile River was so named because it was reckoned ten statute miles distant from the Novo River, formerly the chief settlement. The Indian name of the river is is Bi-dä-to.

THE COAST-LINE FROM TEN MILE RIVER.

From the mouth of Ten Mile River, which is the easternmost indentation of the coast, the shore trends in a general direction northwest one-third west (NW. $\frac{1}{3}$ W.) for fifty and a half miles to Point Gorda. The coast-line is not straight, but retreats east of the above course about six miles.

The marked feature of this part of the coast is the particularly bold and forbidding character of the shores, which rise to great heights and are backed by mountains which attain four to five thousand feet elevation. Transverse gorges mark the flanks of the coast range where small and insignificant streams empty into the ocean. The southern part of this range is covered with forest, but from the vicinity of Point Delgada northward the tops of the mountains are only grass covered, partially wooded, or marked by a dense growth of brush. Many of the peaks along the coast range are embraced in the triangulation of the U. S. Coast and Geodetic Survey, and thus become well determined landfalls and landmarks for coasting vessels, especially for steamers.

The character of the shore bears evidence of severe erosion, and that it must have reached to and beyond the outlying rocks. The larger and higher rocky islets are flat-topped and of the same general height as the adjacent shore line. The lower rocks are very sharp pointed. We suggest that many such may exist under water. The dangers along the coast are close under the high shores, and until within five miles of Point Gorda no known danger extends over one-third of

Newport Landing (inside).

Santiago Mountain.
Newport Bay Entrance, NE. ¼ E., 2½ miles.

Los Ceritos, 355 feet,
NW. by N., 10½ miles.

Anaheim Landing,
N. by W. ¼ W., 6 miles.

a mile from shore. Near Point Gorda, and four or five miles southeast of it, are some isolated dangers one mile off shore. These are described in detail in their proper places.

Kibesillah Rock.—This *danger* is a rock awash in the approach to Newport Landing, and is the outliest off shore of any rock for many miles north and south. It is half a mile south of Newport and lies north four degrees west (N. 4° W.) four and seven-eighths miles from Laguna Point, and north forty-eight degrees west (N. 48° W.) one and one-eighth miles from the mouth of Ten Mile River. It is a small rock, washed over almost continuously even in ordinary weather, and lies three-eighths of a mile off the line of the cliffs. Other rocks and rocky islets lie inside of it, and some of the latter are eighty feet high and from one hundred to two hundred yards in extent, flat-topped and covered with soil.

The three fathom line of soundings lies half-way between the Kibesillah Rock and the cliffs, with from four to seven fathoms of water over moderately regular bottom thence to the rock. Outside, and immediately around the rock, the depth of water is eight fathoms, and it deepens regularly to twenty fathoms at three-quarters of a mile from the rock. One-quarter of a mile east-southeast (ESE) from this danger, and two hundred and twenty yards outside the large rocky islet under the cliff, is a patch of three small visible rocks a hundred yards apart, but with five to six fathoms of water around the group.

Newport Landing.—This is one of the most contracted anchorages on the coast; the cove is only about one hundred and fifty yards east and west by sixty yards across, with cliffs eighty to one hundred feet high. It is broad open to the west, with rocks close under the north point, and sunken rocks more than three hundred yards southwestwardly from the south point. It is fourteen miles northward of Point Cabrillo; five and one-third miles north five degrees west (N. 5° W.) from Laguna Point; and one and a half miles northwest of Ten Mile River. The coast north and south is a line of rocky, jagged cliffs, eighty to one hundred feet in elevation, with bordering islets of the same height. A high islet, one hundred and thirty yards long, lies two hundred and fifty yards northwest by west (NW. by W.) from the extremity of the north point, and ninety yards south of this islet lies a *sunken rock*. Another *sunken rock* lies two hundred and fifty yards south forty one degrees west (S. 41° W.) from the south head. In 1883 another *sunken rock* was discovered broad off the south head. It lies one hundred and twenty yards north of the last mentioned rock, and two hundred and fifty yards south fifty-nine degrees west (S. 59° W.) from the south head; it is marked by kelp.

In 1883 the white houses on the grassy rising plateau behind the landing afforded good marks for approaching the cove.

The chute is on the north point and projects two hundred and sixty feet from the cliff to the end of the apron, under which a depth of eighteen feet of water is reported.

A vessel at the chute lies head out with the chute on her starboard hand. A rock showing at low water lies only thirty-five yards ahead from her starboard bow. A vessel of two hundred tons may load here.

A mooring-buoy lies eighty yards west by south (W. by S.) from the chute close under the summer lee of three rocks; breast-moorings are fastened to the points on either side of the chute. This cluster of rocks breaks the force of the northwest swell at the cove. Two other buoys are placed just outside these rocks, the outer one bearing one hundred and fifty yards west-southwest (WSW.). A fourth buoy is laid close under the northwest side of the sunken rocks off the south head; it is used by the vessels to haul out to, and get under way from in southeast weather. To enable vessels to get a good offing in northwest winds, two buoys have been laid well out from the north point; the inner one is six hundred and thirty yards, and the outer one eight hundred and seventy-five yards south sixty-three degrees west (S. 63° W.) from the head of the chute.

Lumber is shipped from this place; but vessels can not load here more than seven or eight months in the year. The average number loading is fifty annually. The saw-mill is located on Ten Mile River, four and a half miles from this landing. Its capacity is about thirty thousand feet, and the lumber is hauled to the chute.

Since the Fort Bragg Harbor has been established no lumber is shipped from Newport Landing; only posts and ties are loaded here (1887).

Outside of the cliffs the three-fathom line is one-fifth of a mile off shore except at the Newport Cove, where it reaches inside the points. The ten-fathom line is less than one-third of a mile from the cliffs of the south point, and the twenty-fathom line at the distance of one mile. The depth of water is thirty-seven fathoms at two miles and forty-seven fathoms at three miles.

Kibesillah or Ackermann's Landing.—This is a very slight indentation in the coast-line about one mile northwestward from Newport Landing. The coast line between the two is formed by rocky cliffs eighty to one hundred feet high, bordered by rocks, and the land inside rises gradually for four or five hundred yards and then sharply for as much more to the summit of the ridge, which is seven hundred and eighty feet above the sea. The ridge is bare; the gorges to seaward are filled with a heavy growth of oak; the country inside the ridge is densely covered with red wood and pine.

The cove is six miles north eight degrees west (N. 8° W.) from Laguna Point and fourteen and a half miles northward of Point Cabrillo. From the north and south cliffs, which are forty feet high, low rocks stretch out nearly one hundred yards and lie northwest and southeast from each other. Between them the cove is only one hundred and fifty yards across, and contracts rapidly and irregularly inside. Low rocks and *sunken rocks* stretch four hundred yards to the northwest from the northwest point, and two sunken rocks were discovered in the season of 1883 off the southwest point. The outer one of these lies two hundred yards broad off the low rocky shore and three hundred and fifty yards from the end of the chute. The inner rock is half-way between the outer one and the shore.

There is a very substantial wharf built from the west side of the north cliff in a nearly south direction for ninety yards to the southern edge of the low rocks, and continued by an apron over twenty feet of water. No moorings are laid here (1885), and vessels do not come here because there is no demand for ties, etc., so that the landing is practically abandoned.

Close under the south point there is the mouth of a deep, narrow break in the coast-line forming a pocket two hundred and fifty yards long by twenty-five to fifty yards wide, lying parallel with the outer shore. The mouth of this boat landing opens directly to the northwest, with low, rocky points on either side. There is a small stream entering at the head through a narrow sand beach.

Kibesillah is a village two hundred and fifty yards inside the shore line on the mesa land on the south side of the little stream opening into the cove of Ackermann's Landing. Behind it the bare hills rise rapidly to seven hundred and eighty feet.

Bruhel's Point is a long, rounding projection of the narrow mesa strip under the bare hills. It is not made out from seaward, and only seen as a point when a vessel is very close under the shore. The outermost part of the point lies three miles from Ten Mile River and fifteen and a quarter miles from Point Cabrillo.

The cliffs are only forty feet high, jagged, and bordered by a broad, rocky reef over one hundred yards wide. From one hundred to two hundred yards outside this reef lie *six sunken rocks* and two rocks awash, extending fifteen hundred yards along the shore.

The land inside the point rises very rapidly and is bare except in the gulches. One mile northeast by east (NE. by E.) from the point it reaches one thousand feet elevation at the summit of a hill which has pine trees showing around it on the south, east, and north sides.

Bruhel's Point is in latitude 39° 36′ 16″ north.

North of Bruhel's Point there is a narrow sand beach exposed at low water for one mile, backed by a steep sloping shore. Several rocky islets and rocks lie two hundred to three hundred yards off this beach. The land travel runs about two hundred feet above the sea on the very steep mountain side.

One-quarter of a mile off the point there is a rock with not more than sixteen feet of water upon it and depths of eight fathoms around it. The bottom in this locality is very foul, but no dangers have been noted more than a quarter of a mile off shore. The bight to the north of Bruhel's Point and to the south of Bell's Point is rocky and very shoal.

Bell's Point, one and one-half miles northwestward of Bruhel's Point, is a very slight, narrow projecting cliff, sixty feet high and bordered by a large number of rocks. It is sixteen and two-thirds miles from Point Cabrillo. It has two outlying dangers: one, a *rock awash*, lies south forty-nine degrees west (S. 59° W.) seven hundred yards distant from the point; and the other, also a *rock awash*, south forty-two degrees west (S. 42° W.) distant four hundred and fifty yards from the point.

The first mentioned rock is large and flat with ten feet of water upon it. Deeper water is found inside, but vessels should not attempt to go inside of it as the bottom is foul off the point. The wind is apt to be baffling, and the holding ground is bad.

From the outer rock awash off Bruhel's Point to the outer rock awash off Bell's Point the distance is one and two-thirds miles, and the bearing north-northwest (NNW.). From the outer

rock awash off Bell's Point to the outer rocks off Abalone Point the distance is two and a half miles and the bearing north-northwest (NNW.).

Bell's Mountain, lying only thirteen hundred yards east of the point, is one thousand and forty feet in elevation and bare on top, with a few pines on the ocean flank. The great forest of redwood lies to the eastward of the coast ridges.

Westport.—This was formerly Switzer's Chute, three and three quarters miles northwestwardly along the coast from Newport Landing, and half a mile north of Bell's Point. It is seventeen and one-third miles north eleven degrees west (N. 11° W.) from Point Cabrillo. There is no indentation of the broken, rocky line of cliffs. On the contrary a narrow point makes out one hundred yards and off it lie rocky islets over twenty feet high, partially protected by rocks to the northwest. The shore-line northwest and southeast is bordered for nearly three hundred yards with innumerable rocks from awash to forty or fifty feet above the sea. Bell's Mountain, just described, lying one mile to the southeast and nearly half a mile from the shore, is the best landmark. The long northwest ridge from the summit leads nearly to the landing.

The town, of about two hundred inhabitants, laid out on the plateau behind the sea cliffs, is a good guide when its features are known.

It is difficult to describe the approaches. The outermost low rock, eighty by forty yards in extent, lies three hundred and forty yards off shore, and it has two breaks near to and outside of it. The *breaker* nearest to this low rock bears south sixty-eight degrees west (S. 68° W.) distant one hundred and twenty yards from it. The outer *breaker* is south thirty-eight degrees west (S. 38° W.) two hundred yards from the rock. The outer mooring buoy lies just to the westward of the last bearing and five hundred and twenty-five yards from the rock.

There are two chutes here. The southern chute or wharf, which has a large warehouse at its inner end, is built out from the sixty-feet point of cliff over two rocky islets close to it and stretches seaward west-southwest. It is one hundred and thirty-seven yards long to the apron at the northwest point of the outer islet, whence it stretches eighty one feet further towards the west-northwest over nineteen feet of water. Part of this wharf is a truss bridge for forty-seven yards between the two rocky islets; the rest of it is built on timbers set in the rocks. A *sunken rock* lies about sixty yards southwest from the end of this chute. The northern chute commences at the sixty-feet cliff one hundred and fifty yards north of the point, and stretches two hundred and three yards over two small rocky islets to a third one, which lies about fifty yards northwest of the outermost rocky islet of the southern chute. From its extremity an apron reaches out twenty-five yards over the water to a depth of twenty-three feet. This wharf or chute rests on timbers set in the rocks, but as the timbers are in some places twenty-seven yards apart the structure is strengthened by trusses throughout. The outer ends of the two wharves are not more than forty yards apart. The landing can not be anything but dangerous in approaching or leaving. Immediately under the chutes the swell is somewhat broken by the rocks to the northwest.

Three principal mooring buoys have been placed outside in good water for vessels to haul out to, or await their opportunity to load. The outermost, in twelve and a half fathoms, lies seven hundred yards south sixty degrees west (S. 60° W.) from the southern chute; the next inside is in ten fathoms nearly two hundred yards further inshore and a little south of the same bearing, and the third is only two hundred and seventy yards from the chute, and also a little south of the same bearing, in five and a half fathoms of water. This mooring lies a little over two hundred yards south from the large, low, outermost visible rock off which are the two sunken rocks already referred to. Besides these there are other moorings immediately off the chutes. Shipping is suspended four months in the year in winter, when the moorings are lifted and overhauled.

The holding ground off Westport is good in spots, with sandy bottom interspersed with rocks. The owners of the chutes keep the buoys and moorings in good order, so as to hold the schooners. In a line with the apron of the northern chute and the Post-office building there is a sunken rock which is dangerous to a stranger, as it is near the outer buoy but inside of it.

One of the local landmarks used in recognizing Westport in thick weather is the large tank which is up on the ridge just northward of the town.

The lumber is hauled two or three miles by teams from three saw-mills on Wages Creek, which empties into the sea a little over three quarters of a mile to the northward of the landing. The average number of vessels that load here is sixty-five yearly, and as much as eighty-five thousand feet of lumber has been loaded from the north chute in one day. Ties, posts, bark, and shakes, etc., are also shipped.

The latitude of Westport Landing is 39° 38′ 06″ north.

Switzer's Rock is a small, low rock six hundred yards broad off the coast, and five-eighths of a mile to the northwestward of Westport Landing. Every large swell washes over it. One hundred and seventy yards southeast of it lies a *sunken rock* marked by a breaker.

Switzer's Rock has six fathoms of water close around it. The three-fathom curve is two hundred yards inside, and the ten-fathom line four hundred yards outside of it.

Less than half a mile northeast of Switzer's Rock is a sand beach, six hundred yards long, at the mouth of Wages Creek, a small, shallow stream; and a second sand beach at the mouth of another creek lies four hundred and fifty yards beyond the former. Between these two beaches are numerous low rocks and rocks awash extending five hundred and fifty yards. The low-water line of beach extends from near Westport Landing to Abalone Point and beyond, but in several places it consists only of rocks.

There is a rock with only six feet of water upon it seven-sixteenths of a mile northwest by west from Switzer's Rock.

Vessels should not anchor between Abalone Point and Switzer's Rock on account of the foul bottom.

Abalone Point is a slight projection not made out from seaward, nor unless a vessel is close under the shore. It lies nineteen miles north twelve degrees west (N. 12° W.) from Point Cabrillo. The point of the cliff is sixty feet high and is surrounded by low rocks for three hundred yards outside. No outlying dangers are known.

The name Abalone has been given to this point on account of the univalve shell-fish of which the proper spelling is *Aulon*, as given in the description of Monterey Bay.

The geographical position of the Coast and Geodetic Survey station on the extremity of Abalone Point is:

Latitude	39	40	00″	north.
Longitude	123	47	26″	west.

Gordon's Hill, seven hundred and seventy-two feet high and bare to the summit on the seaward slope, lies half a mile inside of Abalone Point.

CAPE VIZCAINO.

From Abalone Point the coast-line trends to the northwest for four miles to this headland, forming a broad bight nearly five miles across and less than one mile deep, into which empty three very small streams. There is a low-water sand beach abreast each stream, and the shore is marked by a smaller number of rocks than to the southward. The forest of redwood comes within three or four hundred yards of the steep shore, and down to seven hundred and fifty or eight hundred feet on the seaward slope of the ridges.

Beyond this bight the coast-line runs nearly straight north-northeast for seven miles, and this brings out the headland rather prominently. The point is a broad and very irregular line of precipitous cliffs for nearly half a mile northwest and southeast. The cliffs are one hundred feet high, very much broken, and bordered by many low rocks two or three hundred yards off shore. The point is furthermore marked by a rocky islet, two hundred and thirty yards long northwest and southeast by one hundred yards wide. This islet, known by the name of *Island Knob*, is more than one hundred feet high and almost touches the shore. Outside of it a *breaker*, approximately located in 1883 as two hundred and fifty yards west-southwest (WSW.) from the northwest point of the islet.

Five hundred yards southeast from Island Knob and two hundred and seventy-five yards from shore is *Cottaneva Rock*, a very small rock not over twenty feet above the sea. Other low rocks lie inside of it, and two others one hundred and sixty yards to the northwest. There are no known dangers outside of Cottaneva Rock and the break off Island Knob.

The geographical position of this cape is:

Latitude	39	43	27″	north.
Longitude	123	49	41″	west.

The magnetic variation was 17° 44′ east in January, 1885, with a yearly increase of 0′.8.

Tebenkoff (1848) places Cape Vizcaino in latitude 39° 48½′, but an examination of the approaches seems to indicate that he intended to assign the name to the point above described.

Landfall.—One of the great landmarks for this section of the coast to vessels well off shore is *Cahto Mountain*, lying twelve miles north eighty-five degrees east (N. 85° E.) from Cape Vizcaino. It rises to an elevation of four thousand and seventy-six feet and should be visible at a distance of sixty miles from the coast. The geographical position of the mountain is:

Latitude	39° 41′ 04″.4 north.
Longitude	123° 31′ 44″.6 west.

The landmarks for Cape Vizcaino (Cottaneva Head) are: Ussal Rock, always black and in section like a trapezoid; Big White Rock (like Lot's Wife's Pillar); Anderson's Cliff; Cluster Cone Rock (the whitest is the most conical but not the largest); Morgan Rock, at the end of Bear Harbor Chute, and Bear Harbor triangulation station, just north of Morgan Rock.

Cottaneva Cove or Rockport.—Half a mile northward of Cape Vizcaino is this small indentation of the shore, but it is to be considered large in comparison with Westport, Kibesillah, Newport, etc. It is broad open to the ocean, but the approaches are freer from rocks than most of those we have described. The south point is formed by the northern part of Cape Vizcaino, and the north point is formed by a bold, sharp, point, off the south face of which lie several rocky islets with no passage-way between them and the shore.

The north point or head lies twenty-three and one-third miles north eighteen degrees west (N. 18° W.) from Point Cabrillo. It is a narrow, pointed and precipitous, sharp cliff, two hundred feet high, projecting three hundred yards to the west-northwest, nearly on the prolongation of the north shore of the cove, with summits of the rocky projections sharp peaked. Several rocky islets lie for two hundred and twenty yards to the southward of its southernmost part. From these islets to the nearest islet of the many small ones off the south point the distance is five hundred and forty yards, and the bearing southeast by south (SE. by S.). The innermost part of the cove is five hundred and thirty yards inside this line. The nearest rock on the southeast is over twenty feet high, and Island Knob, three hundred yards beyond and described on the preceding page, is over one hundred feet high. Both heads rise from the shore line quite sharply, reaching five hundred feet elevation in two hundred yards. Along the southeast shore of the cove are several rocks above water, and in the deepest part of the indentation is a sand beach two hundred and fifty yards long and bordered by a broad beach at low water. The narrow Cottaneva Valley, with a small stream running through it, opens upon the sea here. On the north shore there are two low rocks inside the main group, and a few small ones close under the shore and inside the low-water line. There are some farm houses at the mouth of the valley a few hundred yards back from the low shore-line at its mouth. The land is bare to about eight or nine hundred feet elevation and then the redwood forest begins and is very dense.

There are a few *sunken rocks* reported, the most important of which is the breaker already referred to as lying two hundred and fifty yards west-southwest from Island Knob on the south side of the cove. Another *breaker* is reported three hundred yards south of Sea-Lion Rock (for reference to which see next page). Two other *sunken rocks* lie, one close on the northwest side, and the other close on the southeast side of the outermost rocky islet off the north point. With these exceptions the approaches to this cove are clear and bold, and the cove itself clear of rocks except near the shore-line.

From the south angle of the north point an excellent suspension bridge has been carried one hundred and seventy-five yards across to the nearest rock which is about fifty feet above the sea; from across this rock the tramway runs to the southeast point of it where a chute is projected out to the southeastward forty-five yards over fifteen feet of water. A vessel lies broadside to the chute, heading to the westward, and can easily get to sea with a northwest wind. The lumber is piled on the rock, but even at this height, of fifty feet above the sea, the swell after a southeaster will wash it away unless it be lashed down, and sometimes even the planking in the suspension bridge is carried away.

There are four principal mooring-buoys laid here, three to the westward of the cove and one in the middle of the entrance. The outer buoy, in thirteen fathoms, bears southwest by south (SSW. by S.) distant seven hundred and sixty yards from the chute; the second buoy, in ten and a half fathoms, nearly on the same bearing, distant four hundred and seventy yards from the chute; the third one, in eight fathoms, also on the same bearing nearly, and distant two hundred and forty yards from the chute. The mid-entrance, or southeast buoy, lies in six fathoms, and is used to haul out to, and sail from in southerly winds. Besides these there are several moorings and shore-fastenings about the chute for vessels to moor to while loading.

The mill is located on the north bank of the Cottaneva Creek about one-third of a mile from its mouth. The lumber is brought to the chute over a tramway which winds along on the north side of the gulch at the level of fifty-two feet above the sea to the suspension bridge. Logs are brought to the mill over a steam railway from the Cottaneva Valley. The capacity of the mill is twenty-five thousand feet per day, but the landing is not used for about four months after December 1, and the mill is shut down during that time. The average number of cargoes shipped hence is twenty-four per annum.

This anchorage is considered available for vessels only during the summer season; the heavy northwest swell does not reach this line of coast with its full force, but the southwest swell rolls squarely in.

The geographical position of Cottaneva Chute on the northwest head of Rockport, as determined by the Coast and Geodetic Survey, is:

Latitude	39	44	06	north.
Longitude	123	49	52	west.

In January, 1885, the magnetic variation was 17° east, with a yearly increase of 0.8.

In 1869 Rockport Cove was known as the "Summer Anchorage."

Rockport or Cottaneva Chute is also locally known as "Myers'" Chute.

In 1883 the coast road extended three miles northward of Rockport; beyond that there was only a trail available for transportation.

Cottaneva Landing is barely large enough to keep one schooner in safety in fair weather.

Between Cottaneva Rock and Hardy's Rock the shore-line is bordered with rocks close to shore; but by trying with the lead sandy patches can be found, and a vessel with good ground tackle can anchor in these sandy patches with a partial lee from the northwest sea, and in some measure inside the full strength of the wind.

Cottaneva to Shelter Cove.—Northwestward from Cottaneva no dangers to navigation have been found except those in sight. In summer weather vessels can, as a rule, approach quite close to the shore and outlying rocks. When bound to Shelter Cove in a thick fog, steamers can keep within a quarter of a mile of the shore after passing Bear Harbor if they are running for Shelter Cove and are not perfectly certain of their position. The echo of the steamer's whistle gives a fair idea of the distance from shore, and the lead line will warn them if running too close to the rocks.

Sea Lion Rock lies three hundred and twenty-five yards northwest of the high, sharp northwest point of Rockport Cove. It is only about ten feet above water, thirty-five yards long, and fifteen yards broad. It is resorted to by sea-lions. A *sunken rock* is reported to lie three hundred yards south of the Sea Lion Rock.

Williams' Point and *Soldier Frank's Point*, about a mile to the northward of Rockport, have no special mark or prominence and can not be made out by vessels even close under the land. They are simply local designations of cliffs projecting only one hundred yards beyond the general line of the shore and marked by many rocky islets and rocks. The shore line for two miles hence to the northward is very broken and bordered by many rocks, but none over one-sixth of a mile from shore. No known dangers exist outside the visible rocks.

Northwestward of Rockport Cove begin short stretches of sand beach at low water, broken by jutting points, like the two mentioned above, off which lie rocks extending at the most three hundred yards from shore. At three and a half miles, nearly, from Rockport lie the *Double Cone Rocks*, fifteen and twenty feet high, and two hundred and ninety yards off shore. At five miles lies *Ussal Rock*, always black in color, fifty feet high, forty yards in extent, and two hundred yards off a point of rocks. Six hundred yards behind the shore-line at this point the land rises sharply to eleven hundred feet elevation, and then the redwood forest begins.

Hydrography broad off Ussal Rock.—At one mile there is a depth of fifteen fathoms of water over a bottom of gray sand; at two miles, thirty fathoms over similar bottom; at three miles the depth is fifty three fathoms over green mud, which is first brought up from fifty fathoms; at four miles, sixty two fathoms of water over green mud; at five miles the depth is seventy fathoms water over green mud; at six miles, seventy-seven fathoms, and at seven miles eighty-five fathoms, both over green mud.

Ussal Valley.—From Williams' Point the coast runs nearly straight north twenty-four degrees west (N. 24° W.) four and two-thirds miles to the opening of Ussal Valley, the mouth of which at the deepest indentation of the coast line between Point Arena and Point Gorda, six and a half miles north twenty-four degrees west (N. 24° W.) from Cape Vizcaino, and twenty-nine miles

nineteen degrees west (N. 19° W.) from Point Cabrillo. The small stream of the same name runs through this short valley, but has not sufficient water to break through the sand at the mouth. From seaward the course of the Ussal is marked near the coast by a deep cañon, which opens upon a small area of flat land with a low beach in front. Behind this beach and on the south side of the mouth of the stream is a house. From the mouth of the valley the coast runs to the west-northwest (WNW.) for three or four miles.

Steam vessels running close under the shore to the northward recognize Ussal Valley by the sharp depression, the smooth, grassy hillock inside, and the far view inside; but it is open for a very short time. In 1888 preparations were being made to construct a chute for the shipment of lumber on the west side of the mouth of the valley.

Shelter Anchorage off the Ussal Valley.—In the strong northwest winds that prevail along shore there is often a narrow strip just under the shore where calms and light southerly airs occur, as if there was an eddy formed by the wind banking against the high, bold land of the coast. At other times the wind blows home very strong.

For instance, the Coast Survey steamer has several times anchored in the bight off the Ussal Valley and found comparatively smooth water there, even when the strong breeze was following the trend of the land. The swell was broken by the projecting land in the vicinity of Big White Rock.

During the spring months the winds at night frequently blew in heavy gusts from the land, and this would rapidly smooth down the sea raised by the northwest winds of the day.

Open or Offshore Anchorages from Ussal Valley to Cape Mendocino.—The surveying steamer used to anchor, when weather permitted, wherever sandy bottom was found. When forced by the heavy northwest swell and wind to run southward, each of the following localities were at different times anchored in:

About one mile east southeast (ESE.) from Shubrick Rock in ten fathoms of water over fine gray sand.

One mile off the wreck of the *Active*, which is five and a half miles north of Big Flat.

One mile west of the *Litta* wreck, three miles north of Big Flat and about half a mile off shore.

One half a mile off the coast, and from southward of Mackey's Beach to within one mile of Reynolds Rock.

Outside of the kelp from one mile above Mussel Rock to one-half mile southward of the Devil's Gate Rock, preferably abreast of Domingo's house in range with the shed on the beach.

Sometimes just inside of the kelp patches off this stretch of the shore in from eight to nine fathoms of water.

The rest of the coast from Shelter Cove to Cape Mendocino should be avoided as anchorages on account of the foul bottom, the peculiar currents, the proximity of dangers, and the strength of the winds.

Big White Rock.—From Ussal Valley the steep sides of the coast-range grow steeper; the coast trail keeps higher and runs into the forest. The sand beach breaks off abruptly at Ussal Valley. Big White Rock lies one and five sixths miles from Ussal Valley and thirty miles north twenty two degrees west (N. 22° W.) from Point Cabrillo. It is about eighty yards by forty in extent, about one hundred feet high, and one hundred and twenty yards from the steep shore, which is bordered by many smaller rocks, some of which are over twenty feet high, but all close to shore. One *rock awash* lies two cables and sixty yards off shore and south fifty degrees east (S. 50° E.) three hundred and seventy yards from Big White Rock. A second *rock awash* lies halfway between these two. Two other *rocks awash* lie, respectively, two hundred and ninety and four hundred yards off shore and bearing north eighty-three degrees west (N. 83° W.) five hundred and sixty yards, and north eighty degrees west (N. 80° W.) eight hundred yards from Big White Rock.

Big White Rock is quite a notable feature in the details of the shore-line, and especially so when the higher parts of the shore are under fog.

Behind Big White Rock the forest comes within two hundred yards of the sea, but at an elevation of seven or eight hundred feet.

Hydrography broad off Big White Rock.—At one mile from the shore the soundings show a depth of twenty fathoms of water over a bottom of fine gravel and gray sand; at two miles, forty-three fathoms over gray sand; at three miles, fifty eight fathoms over green mud, which is first

found at a depth of fifty fathoms; at four miles, sixty-nine fathoms over green mud; at five miles, seventy-seven fathoms; at six miles, eighty fathoms; and at seven miles eighty-five fathoms over green mud, as were the preceding soundings.

Northport Landing.—This landing (abandoned 1883) is at a very slight indentation of the steep shores one and one-quarter miles northwest from Big White Rock, under a high and slightly projecting point named *Little Jackass Point.* It is thirty-one miles north twenty-three and a half degrees west (N. 23½° W.) from Point Cabrillo and eight miles north forty degrees west (N. 40° W.) from Rockport. Northwestward of this cove there are no other coves for three miles, but there is one of about the same size half a mile eastward and nearer to Big White Rock. The point which forms the shelter to Northport rises to three hundred feet in two hundred yards, and its eastern side runs one hundred yards northward, then northeastward for three hundred yards, and then curves sharply to the southeast for five hundred yards. In the deepest part of the curve a small creek, called the Little Jackass, enters through a broad low-water beach. There is one small rock thirty five yards west of the point, and a *sunken rock* four hundred yards south fifty-seven degrees east (S. 57° E.) from the point and one hundred and twenty-five yards off the southeast shore-line. A line of five rocks, three hundred yards west from the point, lies north and south for one hundred and eighty yards. The outer rock lies three hundred yards from shore. The middle one is known as Jackass Cone and is twenty-five feet high.

The Landing is broad open to the sea, but the protection is said to be moderately good, as the line of rocks at Jackass Cone breaks the swell, which also appears to be lessened under Point Delgada and Point Gorda. The landing is available for six months in the year.

The vessels were loaded by means of a wire cable stretched from near the extremity of the point, between their masts to a heavy mooring to the eastward in the cove. A cage loaded with tan-bark was lowered from the landing-stage on the cliff down along the cable and over the vessel's deck. The head-mooring for the vessel was laid off the prolongation of the point to the southward, and other moorings and shore fastenings were used to keep the vessel in position.

The geographical position of the Coast and Geodetic Survey station on the northwest side of the hill, about three hundred feet above the sea and two hundred yards north-northwest (NNW. from the extremity of the point, is:

Latitude	39° 51′ 32″	north.
Longitude	123° 54′ 01″	west.
Or, in time	8h 15m 36s.1	

In latitude 39° 48½′ Tebenkoff has named what appears on his chart a very marked point, Cape Vizcaino, with a stream to the eastward that may have been conjectured to exist. We have located his cape at Cottaneva.

Hydrography northward of the Newport Chute.—The station inside the cliff at Newport Chute (Brushy Point) is in latitude 39° 34′ 23″, longitude 123° 46′ 34″. Hence to the northwest abreast the coast in latitude 39° 54′ the three-fathom line keeps close to the rocky shore and just outside the rocky islets which skirt it. In many cases, as just south of Newport Chute, south of Kibesillah Chute, Little Jackass, and Anderson's Cliff, the deep water reaches to the point of the cliffs. The average distance of this depth from the shore is three hundred and fifty yards; but in some few cases isolated dangers lie outside the line, as Switzer's Rock and Sea-Lion Rock near Cottaneva. In the bight near Ussal River there are isolated patches of kelp nearly to Big White Rock. The bottom along the three-fathom line is generally rocky.

The ten-fathom line averages a distance of half a mile from shore, but is less than one quarter of a mile off near Newport Chute, Bruhel's Point, and Cottaneva Chute. Along the line of ten fathoms the bottom is generally rocky with patches of gray sand and broken shells.

The twenty fathom line averages a mile from shore but increases to one and a half miles abreast Ussal Rock. The bottom is generally gray sand, except where the line closes on the shore when it is found to be rocky.

The fifty-fathom line is three miles from shore over a bottom of green mud or gray sand; abreast Cottaneva the distance of the fifty fathom line is only one and three-quarters miles from shore. In all cases the depth increases quite regularly outside the line of five fathoms.

The line of eighty fathoms lies about six or seven miles off shore and is quite regular. The bottom throughout is green mud.

Kelp.—In winter the storms tear away the kelp from the shoal, rocky patches so that a vessel may be misled in spring by not seeing it. But in deep water, eight to fourteen fathoms, the

winter gales do not tear the kelp away, and therefore in the spring a vessel may go safely through the kelp.

THE COAST-LINE TO POINT DELGADA.

From Northport the general trend of the coast to Point Delgada is north fifty-five degrees west (N. 55° W.) and the distance twelve miles; the shore falls back about one and one-quarter miles from this course. The coast is bold, compact, and very high, and the mountains rise to over four thousand feet within five miles of the coast. In part they are bare-topped, and sometimes have trees upon them. The triangulation of the Coast and Geodetic Survey locates several of the higher peaks along the coast range. These peaks are frequently seen and recognized by the coasting steamers when ten or fifteen miles off shore, over the thick haze lying low along the shore and concealing it. And at other times they are visible to vessels moderately close inshore, over the low fog. No known dangers lie further than a quarter of a mile off the shore.

Along this stretch of coast are no names of importance or descriptive to the navigator. They all have a local flavor, and the objects designated can be recognized only when a vessel is within a mile or less of the shore.

Anderson's Cliff.—A short distance northwestward of the recession of the shore at Ussal Creek there is a long, rounding curve of the high coast-ridge. The crest-line reaches twelve hundred and fourteen feet elevation abreast the outermost part of the long, rounding curve at less than half a mile from the shore. The seaward face of this mountain side is covered with a dense growth of bushes, locally known as Chimese, and the crest-line is marked by the heavy growth of pine and redwood.

Anderson's Cliff is the face of a jutting, rocky spur peculiarly marking this part of the coast. It is six hundred and eighty feet high within one hundred and twenty five yards of the shore, and stands out more prominently because a small branch of Jackass Gulch to the northward falls away behind it. There is a large rock with many smaller rocks close under the shore, reaching probably two hundred yards out.

This cliff is two miles northwest by west (NW. by W.) from Big White Rock; three and two-thirds miles northwestward from the mouth of Ussal Creek, and nine and two-thirds miles from Cape Vizcaino. It is eleven and three-quarters miles south fifty-five degrees east (S. 55° E.) from Shelter Cove.

Hydrography off Anderson's Cliff.—At a distance of one mile from shore the soundings give a depth of fifteen fathoms of water over fine gray sand; at two miles forty-five fathoms, fine gray sand; at three miles fifty-nine fathoms over green mud, which is first found at fifty fathoms; at four miles sixty nine fathoms, green mud; at five miles seventy-two fathoms, green mud; and at six miles seventy-nine fathoms over green mud.

Jackass Gulch is the short, contracted valley and small creek one and a half miles northwest of Northport. Its mouth presents the only beach at high water for several miles of coast-line northwest and southeast, although it is only one hundred and fifty yards long. This beach is backed by a small lagoon receiving water from two small streams, one from the southeast and the other from the north. A hill, seven hundred feet high with precipitous front on the ocean, lies one third of a mile on the northwest, and another, three hundred feet high with steep ocean flank, reaching down from Anderson's Cliff, lies just to the south. The gulch is in latitude 39° 52½′ north.

Cluster Cone Rock is the whitest, most conical, but not the largest of a small cluster of high rocks extending two hundred and twenty five yards from the high point which forms what was formerly known as Bear Harbor. It is about eighty feet high, and lies four and two thirds miles northwest from Big White Rock and nine miles south fifty seven degrees east (S. 57° E.) from Shelter Cove. The largest rock is sixty yards in extent and over one hundred feet in height. These rocks serve to break the northwest swell which rolls into the small cove under the point.

This cove is a slight indentation of the shore-line, but principally formed by the high point jutting out one hundred yards towards the southeast. The low-water beach runs east from very near the extremity of this point, and the water outside is shallow. Formerly material was landed or taken from here in lighters.

Inside the point there is a small stream whose main branch comes for a mile from the westward parallel with the shore, and only one hundred to two hundred yards behind it; but the ridge between the stream and the shore rises to over three hundred feet elevation, and is quite a feature in the locality, although not so marked as a larger and similar one one mile to the westward.

The latitude of Cluster Cone Rock is 39° 54¾′ north.

The surveying steamer anchored several times below and just outside these rocks and found good holding-ground, with the wind and sea much lighter than outside.

Bear Harbor Landing.—Very nearly half a mile west northwest from Cluster Cone Rock lies a patch of rocks extending two hundred yards from the high, rocky cliffs. The area of these four rocks is about one hundred yards by fifty, and they were formerly known as Morgan's Rocks. They lie eight and two-thirds miles south fifty-eight degrees east (S. 58° E.) from Point Delgada (Shelter Cove) and thirteen miles north forty-two degrees west (N. 42° W.) from Cape Vizcaino.

From the cliffs abreast Morgan's Rocks a very substantial wharf has been built (1885) to the rocks nearly due south. It curves from the inner rock to the high and outer one, and extends with an apron over fifteen feet of water. A vessel is moored broadside to the end of the apron with her head out. There is a sunken rock close off her starboard quarter when thus moored. The depth of water is five fathoms at two hundred and fifty yards outside, and there are two mooring-buoys laid to haul out to and get under way from.

The landing is broad open to the swell of the Pacific, and the ordinary line of breakers reaches to the limit of the rocks on the west side and just inside the vessel at the chute.

One mile west-northwest from Cluster Cone Rock and eight miles south fifty-seven degrees east (S. 57° E.) from Point Delgada, there is a notable ridge rising three hundred and ninety-five feet high within one hundred and twenty yards of the shore line. It is parallel with the coast line for three or four hundred yards, and has a depression of one hundred and twenty feet behind it. Within half a mile inland the steep mountain side reaches nine hundred feet elevation at the lower edge of the forest. On the eastern prolongation of this ridge lie the rocks midway towards the Morgan Rocks, the Morgan Rocks themselves, and Cluster Cone Rocks. It shows very prominently from the direction of Shelter Cove when a vessel is close inshore. A low-water beach begins abreast this ridge and borders the steep shores to the northwestward for about three miles.

Hydrography off Bear Harbor.—Off Bear Harbor the water shoals suddenly to a depth of fifteen or twenty fathoms. This bank or plateau extends toward the northward. At one mile from the shore the soundings show a depth of seventeen or eighteen fathoms of water over a bottom of gray sand; at two miles, twenty fathoms, gray sand; at three miles, twenty-nine fathoms, gray sand; at four miles, thirty-nine fathoms of water over rocky bottom, this being the tail of the Tolo Bank; at five miles, forty nine fathoms, green mud; and at six miles, seventy fathoms, with gravel and green mud.

Needle Rock, about twenty yards in extent and thirty feet high, lies within ten yards of the shore-line inside the low-water beach. It is six and three quarters miles south sixty-two degrees east (S. 62° E.) from Point Delgada.

Whale Gulch is five and three quarters miles south sixty-four degrees east (S. 64° E.) from Point Delgada. It is the name of a tertiary triangulation station. The shore is very steep, and four hundred yards broad off it lies a rock about twenty yards in extent. The line of forest, two-thirds of a mile inland, is at sixteen hundred feet elevation. The coast trail leaves the shore and ascends the ridge to the northwest.

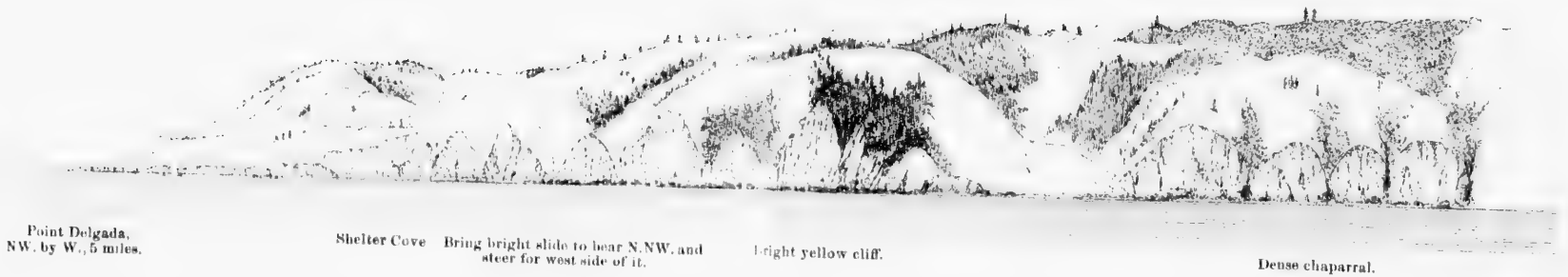
Point No Pass is no point but a very slight rounding projection where the traveler can not pass along the shore. It is five miles southeastwardly from Point Delgada.

White Rock is a small rock just outside the low-water beach and four miles southeastwardly from Point Delgada.

POINT DELGADA AND SHELTER COVE.

Four and a half miles southeastward from Point Delgada the seaward face of the coast range is no longer covered with grass or with forest, but with a dense, moderately low brush, known by the general name of chemisal. This presents a uniform and very dark-green foliage. At White Gulch a sharp ridge begins to rise at the coast-line and runs straight to the northwest by north (NW. by N.) to its culmination at *Chemisal Mountain*, which is twenty-five hundred feet high and one and one-sixth miles from the shore, almost overhanging the ocean. This mountain lies north eighty-two degrees east (N. 82° E.) two and nine-tenths miles from the southern part of Point Delgada. The shore line of this great ridge is nearly straight, and closely bordered by a few rocks not over two hundred and fifty yards from the shore in any case. The high compact barrier of the coast mountains continues northwestward, but from its seaward flank a cliff-faced plateau, destitute of forest, and rising gradually from twenty to one hundred and twenty feet in height, and

Cliffs and rocks about 12 miles SE. from Shelter Cove.



then rapidly increasing to one thousand, makes square out for over one mile from the general trend of the coast. This is Point Delgada, which is sixty five and two-thirds miles north thirty degrees west (N. 30° W.) from Point Arena Light-house, and nineteen and two-thirds miles south sixty degrees east (S. 60° E.) from Point Gorda. From Cape Mendocino it is thirty miles southeasterly, following the general trend of the shore. The seaward face of this plateau is one mile long in a northwest by west and southeast by east direction, and is bordered by many rocks, especially at the southernmost point where sunken rocks extend over half a mile from shore. Inside of the southern point of this plateau the shore retreats over one-third of a mile to the northward, with a precipitous front rising rapidly to five hundred feet in height, and still higher to the northeast and east. From this northern sweep of the shore it turns to the east-northeast and then to the east-southeast to Point Mal Pass, nearly one mile eastward from the southwestern point of the harbor.

Shelter Cove is formed by this recession of the shore-line, and is a very good refuge for sailing or steam vessels during heavy summer winds. It is broad open to the southeast, and a large swell always rolls in.

Shelter Cove is a good northwest lee, but it is a dangerous anchorage in southeasterly weather, when the southwest swell always comes up. In such a swell it is not safe to anchor in less than ten fathoms of water.

When there is a night breeze in summer it is generally from the north, and blows down the hills and through the gorges with sudden and great fury. To avoid dragging, the surveying steamer found it advisable to lie to both anchors. Steam-vessels coming from the south and seeking for Shelter Cove in foggy weather run within one-quarter of a mile of the shore and keep their distance therefrom by the echo of the whistle.

The mountains of the coast range north and south of Point Delgada are very high and make good landfalls far out at sea, but their individual characteristics have not been sketched or studied. From the deck of a vessel the higher peaks should be visible at a distance of seventy miles, especially before sunrise in favorable weather. A vessel should just be able to make out *King Peak*, forty-two hundred and sixty-five feet high, and lying north thirty-three degrees west (N. 33° W.) eight and one-third miles from Point Delgada and two and a half miles from the coast line, when abreast of Point Arena.

Landmarks for Point Delgada and Shelter Cove.—Kaluna Cliff; cottage and barn on the beach between the wrecks of the *Lila* and *Active*, the former three miles north of Big Flat, the latter two and a half miles north of Big Flat; Gorda Rock; Sea Lion Rock; Mussel Rock, red and conical, with a dome shaped rock just behind it on the beach; Steam-boat Rock, and Sugar-loaf or Cape Rock.

The *dangers* off Point Delgada and at Shelter Cove are as follows:

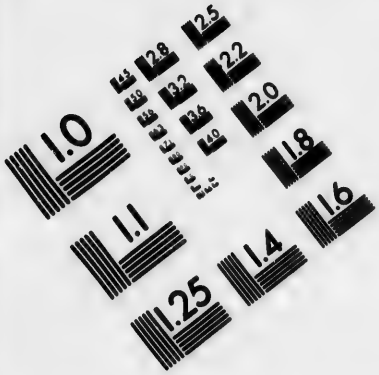
Five-eighths of a mile southeast (SE.) from the southern extremity of the point is a reef with *two points of rock* having fifteen feet of water upon them, but four fathoms and over beyond the patch of kelp, which is two hundred yards in extent and marks this foul bottom.

Inside of this danger and six hundred and twenty-five yards east-southeast (ESE.) from the point there is another *sunken rock*, with fourteen feet of water upon it. It is marked by a small patch of kelp, and there is a depth of five fathoms outside it and three fathoms between it and the breakers one hundred yards westward.

The visible rocks off the south point extend about three hundred and fifty yards off shore, and directly south of the point for nearly one mile the ground is broken and irregular, with two fathoms of four and a quarter and four fathoms at half a mile and two thirds of a mile, respectively. The outer area of irregular bottom is two hundred and fifty yards in extent and is marked by a heavy field of kelp, which reaches to six fathoms of water towards the south. The inner, four-and-a-half fathom spot has no kelp.

Inside these two areas, and bearing southwest by south (SW. by S.) from the southern point and only seven hundred yards from the nearest cliff, are *two bayonet rocks*, nine and twelve feet below the surface of the water, with four to seven fathoms close around them.

Vessels coming from the northwestward must therefore exercise great caution in rounding the point. Coasting schooners with a good working breeze, or steamers, may safely pass around the point within half a mile, and round up inside the two outer patches of kelp; or in the exercise of the greatest caution they may pass the south point at a distance within one mile, just outside the southern patch of kelp, and then head up inside the eastern patch. Anchor in five



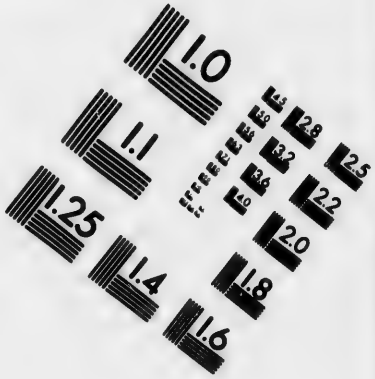


IMAGE EVALUATION
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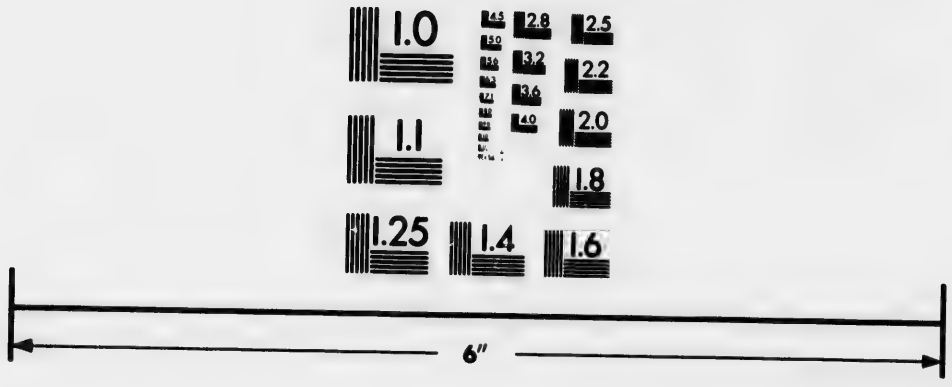

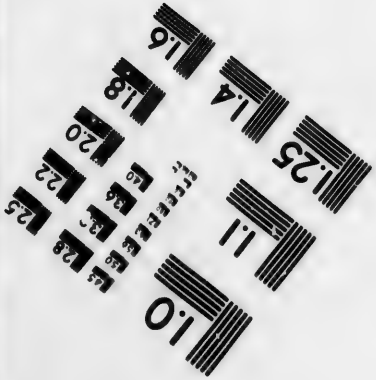

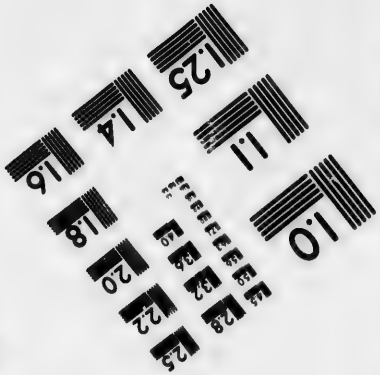

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fathoms with the extremity of the point bearing west (W.), and the flag-staff on the spur, three hundred and sixty feet high and two hundred and eighty yards inside, bearing northwest (NW. The bottom is hard, fine, black sand, and the three-fathom line is two hundred yards distant to the north, and the bluff seven hundred yards distant. The nearest part of the point towards the west is seven hundred yards distant.

Vessels coming up the coast from the southeastward, when Point Delgada bears northwest by west (NW. by W.) distant five miles, will see a very bright, high cliff, four times as high as it is broad, to the eastward of the rocks at the point, that affords a good mark for running in to the anchorage. Bring this bright slide to bear north-northwest (NNW.) and run for the west side of it.

Schooners working up from the southeastward can make short tacks under the shore to avoid the large swell of the northwesters.

One of the coasting steamers touches here; she runs into three and a quarter fathoms of water to the outermost of three mooring-buoys where the flag staff bears northwest three-quarters north (NW. ¾ N.), the southern point west-southwest (WSW.), and the outermost visible rock south-southwest (SSW.). But a visible rock lying southeast three-quarters south (SE. ¾ S.) is only one hundred and twenty yards distant. The second buoy inside is in fourteen feet of water, and the innermost one marks a *sunken rock* with three feet of water upon it.

A short distance inside the inner point, where the cliff is sixty or seventy feet high, there has been built out to beyond low water mark a dry stone pier about sixty feet in extent, at which lighters load and unload cargo for the steamer. There are two lighters (1885), one of forty and one of ten tons. A wagon road has been made along the face of this cliff from this pier. The main articles shipped are farm products and wool. The latter is brought by pack trains from the south fork of Eel River, and for distances of thirty miles. The principal article brought here from San Francisco is salt, with hardware, flour, sugar, and general merchandise.

The point where the lighter used to land before the pier was built is under the reef making out one hundred and thirty five yards from the fourth small point from the harbor outside of it to the westward. It is about six hundred yards westward of the harbor where the bluff is only twenty feet high. The lighter was moored off the bluff under the protection of the reef.

A good wagon road leads from Shelter Cove into the interior, and the coast telegraph line passes four miles from the cove. This harbor is the best open refuge between Trinidad and Mendocino Bay, and may be regarded as a harbor of refuge for small coasters which have experienced heavy weather off Cape Mendocino and are short of wood and water, both of which may be obtained here from one or two gulches opening on the sea. From the five-fathom anchorage there is fresh water in the ravine bearing north. In 1853 an Indian village existed in the bottom of the wooded ravine one mile further to the eastward.

There is always a swell here and boat landing is not always easy, but the wind and swell are in great measure modified by the protection of Point Gorda and Cape Mendocino; and the cold fogs lose some of their density and chilliness close under this high mountain coast.

Although there are no trees upon Point Delgada, and it is difficult to make out when a vessel is ten miles off shore, yet some large houses on the plateau and some store-house buildings recently erected may be seen from a distance of four or five miles seaward.

The secondary astronomical station of the Coast and Geodetic Survey was located on the southeast part of the cliff overlooking the harbor and about sixty feet above the sea. The boat passed through the reef without previously knowing its dangers and landed where the cliff is about forty feet high.

The geographical position of the station is:

Latitude	40° 01′ 13″.7 north.
Longitude	124° 04′ 04″.3 west.
Or, in time	8h 16m 16s.3.

The computed magnetic variation for January, 1885, is 17° 54′ east, and it is increasing about 0.′9 yearly.

Upon old Spanish charts an indefinitely located point is designated Point Delgado; as there is no other point of mark in this vicinity it doubtless refers to this.

La Perouse, in 1787, called it Punta del Gada. Tebenkoff's chart, 1848, locates Point Vizcaino in latitude 39° 48¼′, longitude 123° 53′, but the adjacent shore to the east does not agree with that at Shelter Cove. We have applied Tebenkoff's name to the point at Cottaneva in latitude 39° 43½′ north. He applies the name Point Delogado or Delegado to Punta Gorda.

The present name was assigned to the point by the Coast and Geodetic Survey.

The Indian name of the cove is To-not'-ken, from the tribe inhabiting this vicinity.

Shelter Cove was so named by the Coast Survey in 1853, and a hydrographic sketch accompanies the Annual Report of 1854. The topography and hydrography were executed in 1871 and 1880; its relation to the coast is well exhibited on the new chart from Point Arena to Cape Fortunas.

Hydrography off Shelter Cove.—Broad off the coast-line in latitude 39° 54′, on a bearing southwest half south, the depth increases with comparative regularity. The five-fathom line is two hundred and fifty yards from shore with irregular fields of kelp inside; the ten-fathom line is half a mile from shore with bottom of fine gray sand; the twenty-fathom line is one and five-eighths miles from shore, and the thirty-fathom line is two and one-eighth miles with similar bottom; the fifty fathom line is at three and one-eighth miles over green mud; thence to seven miles the depth reached is about seventy-five fathoms over green mud. The line between fine gray sand and green mud is very nearly the line of forty fathoms.

Eddy Currents near Shelter Cove.—The currents along the coast from Newport Landing to Shelter Cove are quite irregular during the summer. In two seasons the coast surveying steamer frequently found a set to the northwestward close inshore, while the general movement was to the southeastward along the coast.

Shelter Cove—Currents to Point Gorda.—At the open anchorages between Point Delgada and Point Gorda the Coast Survey steamer found the current running to the northwestward at the rate of one to one and a half knots with very few exceptions. The strength of the current seemed to vary from day to day, as did its breadth.

When the steamer was surveying in the submarine valleys in this stretch of coast the currents were found particularly irregular and conflicting.

The Tolo Bank.—Immediately north of this point on the coast, in latitude 39° 54′ north, the soundings indicate the presence of a bank, which stretches four miles northwest by north, somewhat parallel to the coast, and then runs inward to Point Delgada. The tail of this bank at thirty fathoms is in latitude 39° 52½′ and four and one-quarter miles from shore. As the bank is followed to the northwestward it decreases irregularly in depth to the *Ground Swell Ledge*, where the least water found is a depth of seven and three quarters fathoms at three miles south sixteen degrees east (S. 16° E.) from Point Delgada and three miles broad off the coast. This irregular ledge covers an area of over one square mile, in which the soundings range in spots from seven and three-quarters to seventeen fathoms. The shoal places inside of fifteen fathoms are well marked by six or seven fields of kelp. Immediately north of this shoalest part of the bank the depths reach twenty fathoms in a few places and decrease towards Shelter Cove and Point Delgada, over gray sand and rocky bottom, to within half a mile of the point, when patches of kelp occur in five to seven fathoms of water. The breadth of the bank within the twenty-fathom lines is from one to two miles.

Upon the shoalest parts of this bank, where the depth is ten fathoms and less, the large westerly swells of the Pacific sometimes break. Observations have been taken upon these breaks when the large ground swell was rolling in from the west-northwest without any local wind to raise white caps.

Inside of the bank the water is deeper for a mile or two and then shoals to the shore, where the ten-fathom line is only half a mile distant therefrom. The three-fathom line averages only three hundred and twenty yards from shore. Inside of the shoalest part of the bank the soundings decrease very regularly from seventeen fathoms over gray sand and fine gravel to the five-fathom line at three hundred yards from shore. The shore line is bordered by rocks, yet they are never found outside the three-fathom line.

Along the crest of the bank the soundings indicate rocky bottom; inside of it there is fine gray sand, with occasional casts of coarse gravel and broken shells. Outside of the bank the soundings drop to fifty fathoms at less than six miles from the shore, with a bottom of green mud, which is found at the forty-fathom line as it is to the southward.

Abreast of Shelter Cove and Point Delgada the three-fathom curve is close under the shore, not averaging more than two hundred yards therefrom, and on a line seaward southwest by south the ten fathom line of soundings is half a mile out with a bottom of gray sand and broken shells. The twenty-fathom line is one and a half miles off the shore with bottom of fine gray sand; the thirty fathom line is two and a half miles off the shore with similar bottom, and the forty-fathom

line is three and two-thirds miles from the shore with fine gray sand and green mud, as it is farther to the southward.

A depth of eighty-five fathoms is found at six miles from shore with a bottom of green mud.

The submarine valley to the west-southwest of Point Delgada is described on pages 309, 310, etc.

Upon this bank the currents are conflicting. On several occasions the Coast Survey vessel was in this locality, and she found herself drifting directly to windward with a strong northwest wind blowing and a rough sea. Outside the limits of the bank the current was setting to the southeastward with the wind and sea.

In October, 1872, we were anchored two or three miles off the coast about nine or ten miles south of Shelter Cove. The current was found running to the northward. The sub current was directly on shore, the leads of the fishing lines being carried to the eastward. There was very little wind, a moderately large swell, and clear weather.

POINT DELGADA TO PUNTA GORDA.

Punta Gorda lies nineteen miles north sixty degrees west (N. 60° W.) from the northwest part of Point Delgada, and the shore-line recedes two miles to the northeastward of that course about four miles northwest from the latter point; it then curves to the westward again to Big Flat, which lies seven and two-thirds miles north fifty-five degrees west (N. 55° W.) from the same point. The flanks of the mountains in this stretch of coast are very steep and covered with chemisal and forest trees. The first parallel of coast mountains rises to nearly forty-three hundred feet elevation at two and a half miles from the shore, and they are therefore visible far out at sea. Within five miles from the shore behind this line of mountains, and nearly parallel therewith, runs the Mattole River which rises in the latitude of Point Delgada and debouches north of Point Gorda.

The shore of the broad bight northwestward of Point Delgada is relatively free from rocks; three-quarters of a mile north of the northwest part of the Delgada plateau the irregular outline of the shore, which is bordered by rocks and rocky islets, changes to a clean shore line for four miles, bordered by a sand beach bare at low water from twenty to one hundred yards in width.

In this bight the thirty-fathom line lies two and one-third miles off shore in a general direction northwest by north half north (NW. by N. ½ N.), and reaches close to the shore under Fire Hill. Outside of this line the depth increases to three hundred fathoms in two miles to the axis of the great submarine valley described on page .

The road from Shelter Cove leaves the hillsides and takes to this beach.

Kuluna Cliff, which is fourteen hundred and seventy feet high and only seven hundred and twenty-five yards inland, overhangs the southern end of this sand beach. The tops of the trees growing on the eastern side of this precipitous steep are seen over the ridge.

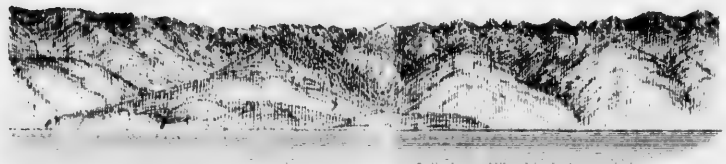
The name is derived from a Sandwich Island brig which went ashore directly under the cliff. The cargo of lumber was partly saved by people living in the vicinity, but before they could haul it away a land-slide buried the greater part of it under several hundred tons of earth and rock.

One mile northwest from Kuluna Cliff the sands have blown in on the shore for a breadth of thirty to one hundred and thirty yards and a length of nearly three miles, and as much as thirty five feet in height. This is quite a feature for recognizing the locality.

Horse Mountain, which is nineteen hundred and twenty feet high and only twelve hundred yards from the shore, rises very sharply, and its seaward flanks are mostly bare of trees; but on the south face there are a few oaks and pines, and on the west a few scattered pines. The summit is four miles north twenty-one degrees west (N. 21° W.) from Point Delgada. There are higher ridges to the eastward of this mountain. Two miles westward from Horse Mountain the flanks of the mountains become covered with pine and deciduous trees, but it will be noted that most of the sharp ridges facing seaward are bare of forest trees.

Fire Hill is the culmination of the wooded mountain side about six miles from Point Delgada, and reaches twenty-eight hundred and thirty-five feet elevation in less than one mile from the shore. Its steepest slope is sixteen hundred feet in five hundred and fifty yards, directly up from the ocean. From the top of this sixteen hundred feet promontory a sharp, treeless ridge runs southwest by west one-third of a mile to the beach. The deep, dark wooded gulch of Buck Creek lies just south of Fire Hill.

Miller's Ridge, which reaches twenty-eight hundred feet above the sea, lies one mile inland and two miles east by north half north (E. by N. ½ N.) from Big Flat. It is characteristically

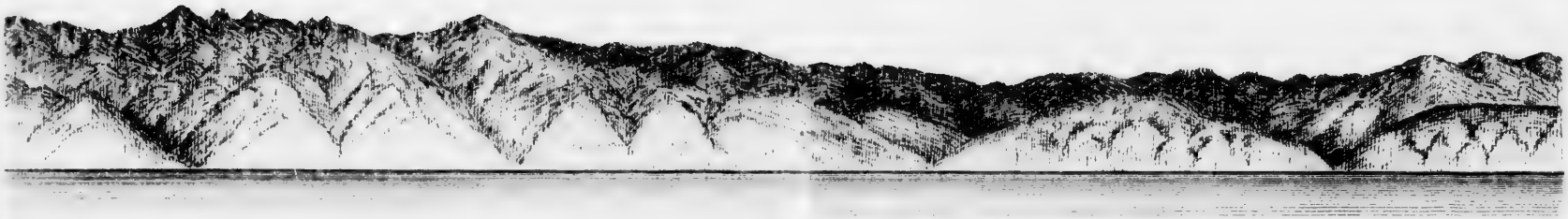


Point Delgada,
NE. by E. ¼ E., 10½ miles.

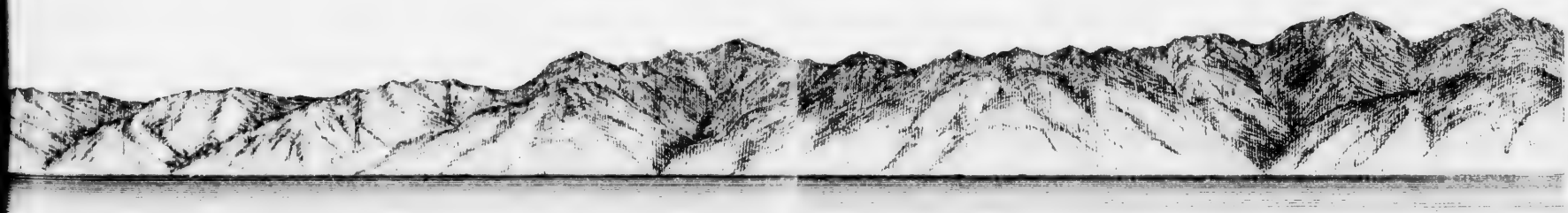
Shelter Cove.

Chemise Mountain,
2,500 feet.

Coast from Shelter Cove to Punta Gorda, in 4 views; View 1.



Coast from Shelter Cove to Punta Gorda, in 4 views; View 2.



Coast from Shelter Cove to Punta Gorda, in 4 views; View 3.

Hadley Peak, 2,710 feet. North Slide, 3,400 feet.

2,780 feet.

King Peak,
4,265 feet, NE., 12½ miles.

denoted by a bold, clear head two-thirds of a mile south-southeast from it and reaching one thousand feet elevation in four hundred and forty yards from the sea. Under this head the low-water beach changes to one of rocks extending fifty yards outside the high-water line.

KING PEAK.

This is the highest peak in this region of the coast range, and is one of three which are well known landfalls named the "Three Peaks." It is only two and a half miles from the shore and attains an elevation of forty-two hundred and sixty-five feet. As seen from seaward this mass of mountains is very grand, and the deep cañons cutting through them give the impression of inaccessibility. It is visible on the horizon at a distance of seventy-four miles.

This peak lies north thirty three degrees west (N. 33° W.) eight and one-third miles from Point Delgada, and its geographical position has been determined by the Coast and Geodetic Survey as follows:

Latitude	40° 09′ 17″.6 north.
Longitude	124° 07′ 26″.1 west.
Or, in time	8h 16m 29s. 7.

For the description of the great submarine valley lying off Point Delgada and heading towards King Peak see remarks upon the Hydrography from Shelter Cove towards Cape Mendocino, pages 309, 310.

The Shubrick Rock is a small rock, only ten or fifteen yards in extent, lying three hundred yards off the southern end of the broad, sandy margin of Big Flat. It is seven miles northwest three quarters west (NW. ¾ W.) from Point Delgada. Near it the Light-house steamer *Shubrick* was wrecked in 1867, running on the beach three hundred and seventy yards northwest of the rock. She was afterwards safely gotten off.

Big Flat lies seven and two-thirds miles north fifty-five degrees west (N. 55° W.) from the northwest part of Point Delgada, and is a narrow, low, and slightly projecting line of land two miles along the coast, and from two hundred to five hundred yards wide. It is bordered seaward by a strip of sand from thirty to one hundred and thirty yards in width, and this again by a sand and bowlder beach, bare at low water, from fifty to eighty yards in width. Behind, the flat, steep slopes partially covered with oak and pine, rise to twenty-four hundred feet at Miller's Ridge, one mile in from the south end. The hills continue to rise to twenty-seven hundred and eighty feet at Shubrick Peak, within two-thirds of a mile of the north end of the flat. The ridges from these peaks are mostly bare of timber. Between them issues through a short deep cañon the mountain stream known as Big Creek, with its broad winter channel-way filled with sand and bowlders. It expands near the beach, but does not force its way through in summer. The wreck of the *Shubrick* was five hundred yards east-southeast from the mouth of this stream.

Two or three lines of old sea-beaches are visible on the south side of the creek, the highest nearly twenty feet above the sea.

The geographical position of the Coast and Geodetic Survey station Big Flat on the extreme southwestern part of the flat is:

Latitude	40° 07′ 48″.2 north.
Longitude	124° 11′ 02″.8 west.
Or, in time	8h 16m 44s.2.

In January, 1885, the line of equal magnetic variation of 18° 00′ east crossed the coast-line [illegible] nearly in the latitude of Big Flat. It moves southward nearly one minute of arc annually.

From Big Flat to Punta Gorda the coast-line is remarkably straight for eleven and one-quarter miles north sixty-three degrees west (N. 63° W.). Half a dozen short, small mountain streams come upon the shore, which has a few rocks off its northwestern half. The mountains are very high, varying from sixteen hundred to twenty-eight hundred feet within one mile of the ocean.

Hydrography broad off Big Flat.—Leaving the shore in latitude 40° 07′ 48″ north and longitude 124° 11′ 03″ west, the soundings show that at one mile the depth of water is twenty-seven fathoms over a bottom of broken shells, and gray sand, fine and coarse; at two miles, fifty-five fathoms, over fine gray sand; at three miles, seventy fathoms over blue mud which was first found at a depht of sixty four fathoms; at four miles, seventy-eight fathoms, over fine gray sand and blue mud; at five miles, one hundred fathoms, over blue mud, and at six miles, one hundred and fifty fathoms, over blue mud.

Kelp.—There is a small patch of kelp to the westward of Big Flat, but no indications of less than six fathoms of water were found in it. However, no vessel should go through it.

Spanish Flat is four and a half miles northwestward from Big Flat and thirteen miles north sixty-one degrees west (N. 61° W.) from Point Delgada. It is the northern end of a line of sandy shore from thirty to two hundred yards wide, and reaching southward to within one and a half miles of the north end of Big Flat. Outside of this sandy shore lies a low-water sand beach and rock beach; many small rocks lie two hundred to three hundred yards off shore. Near the upper end of Spanish Flat the steamer *Active* was stranded and became a total wreck in 187-; there was a high fog at the time hiding the tops and slopes of the hills, but the coast-line could be seen, and persons along the shore to the southward saw the steamer passing unusually close to the land. She lay one hundred and twenty yards off the shore line.

Behind Spanish Flat rises Hadley's Hill, twenty-seven hundred and ten feet elevation, with its flanks clear of timber; the long bare ridge of Wild Oats Hill, twenty-three hundred and twenty feet; and Spanish Hill, twenty-two hundred feet. These are bare of trees but the intervening gorges are filled with redwood and oak.

Reynolds' Rock lies six and a half miles north seventy-five degrees west (N. 75° W.) from Big Flat, and four hundred and eighty yards off the shore directly under the almost precipitous slope of Reynolds' Spur, eight hundred and twenty feet high and only three hundred and twenty five yards inland. On either side of the spur there are clumps of redwood and oak, but it is bare below and above to the top of Lake Hill Ridge, which rises to twenty-two hundred feet and more.

Reynolds' Rock is but a few yards in diameter and twenty feet above the sea.

Hydrography broad off Reynolds' Rock.—The soundings show that at one mile from the shore the depth of water is twenty fathoms over a bottom of fine gray sand; at two miles, thirty-five fathoms, fine gray sand; at three miles, sixty-four fathoms, blue mud; at four miles, one hundred and twenty fathoms, fine gray sand; at five miles, one hundred and ninety-seven fathoms; and at six miles, two hundred and fifty fathoms.

Rodgers' Break.—This *hidden danger* was discovered during the topographical survey of this shore. It is a break on a sunken rock thirteen hundred and eighty-five yards broad off the coast line above Reynolds' Rock and under Lake Hill. It is marked on the recent chart as *New Break*, and lies six and three-quarters miles north sixty-nine degrees west (N. 69° W.) from Big Flat, and four and three-quarters miles south fifty-three degrees east (S. 53° E.) from the conical rock off Point Gorda. From the northwest part of Point Delgada it is distant fourteen and one-third miles, and bears north sixty-one and a half degrees west (N. 61½° W.). This is the farthest outlying danger along this stretch of the coast. In the hydrographic survey of this locality in 1886 the least water found on this sunken rock was three feet, with twelve and thirteen fathoms immediately around it, and a passage-way with more than six fathoms of water three hundred and fifty yards wide between it and the shore. There is less than three feet of water upon it at extreme low tides, and the top was seen by the surveying steamer once or twice in the hollow of the large swells. It is a very sharp-pointed pinnacle rock of the same form as the Gorda Rock and breaks seldom.

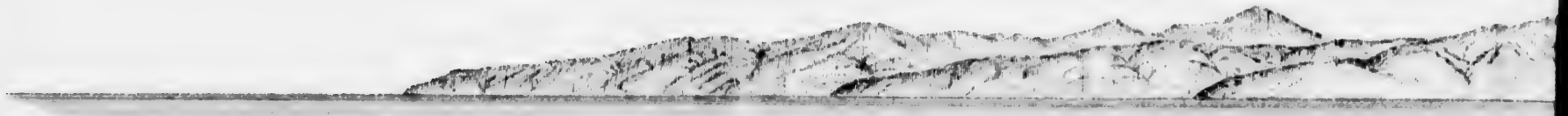
The top of the rock is very small, and its greatest length is parallel with the shore line.

There is ample room and good depth of water between it and Reynolds' Rock for steamers to pass through if they are skirting the shore closely, but they should keep outside.

For a mile along the beach northwestward of Reynolds' Rock there are plenty of rocks close under the shore, and at seven hundred and fifty yards from it there is a *sunken rock* three hundred and fifty yards off shore; at one thousand yards there is another *sunken rock* three hundred and thirty yards off shore, but both of these are less than one hundred yards outside of the visible rocks, which are about twenty by ten yards in extent. Thence the low-water line is rocky and continues bordered by hundreds of rocks to Point Gorda.

At three and one-third miles southeastward of Gorda Rock is the gorge of Couskie Creek, which is quite conspicuous. The hills are depressed here, and this depression can be readily made out in the night. The captains of the coasting steamers, hugging this shore closely in the night, find this a good mark for making Point Gorda.

Rocks off Sea-Lion Gulch.—Two and a half miles southeast from Point Gorda there is a very slight indentation of the coast-line where the rocks commence in great numbers, and a cluster of moderately high rocky islets lies from one hundred and fifty to two hundred and seventy-five yards off shore. About seven hundred and sixty yards broad off the deepest part of this bight, and directly south of the cluster of rocky islets, lies a *sunken rock* not yet named. The rocky islets



Punta Gorda, NW. by N. ½ N., 13 miles. 2,365 feet. 2,791 feet. Lake Hill, 1,740 ft. Mattole Mountain, 3,033 feet.

Coast from Shelter Cove to Punta Gorga, 4 views: View 4.

Sugar Loaf, 331 feet, by Cape Mendocino, NW. by N. ½ N., 15½ miles. Punta Gorda Rock. Punta Gorda, N. by W. ¼ W., 4 miles.

Punta Gorda, E.SE., 9 miles. Behind Reynold's Rock. Distant, Point bearing SE. by E.

are much frequented by sea-lions, and the deep gulch abreast of them has been named after them Sea Lion Gulch. Directly over this bight rises the southeastern end of the great treeless ridge running three miles east from Point Gorda, and reaching twenty-three hundred and sixty feet elevation at Mount Gorda. All its flanking gorges are filled with redwood and oak.

Four Mile Creek Rock.—Abreast of the most outlying visible rocks near Four Mile Creek there is a sunken rock about one-third of a mile off shore. It has only four feet of water upon it, and like Rodgers' Break it very frequently does not break even when there is a heavy northwest swell.

PUNTA GORDA.

To vessels bound up the coast and following its trend as formed by the principal points, Cape Mendocino is hidden until they are up with Punta Gorda.

This headland, as its name implies, is a large, high, bold, and rounding cape, with its shores trending from the point southeast by east (SE. by E.) for two and a half miles, and north (N.) from the point for three or four miles.

It lies north sixty degrees west (N. 60° W.) nineteen and three-quarters miles from Shelter Cove; north thirty-six and a half degrees west (N. 36½° W.) eighty-three and a half miles from Point Arena Light-house, and south twenty-eight degrees east (S. 28° E.) ten and three-quarters miles from Cape Mendocino.

One great treeless ridge of sixteen hundred feet elevation comes from the northeast to the south edge of the cape. This forms the pitch of the cape; but its massiveness, as seen from seaward, is increased by the great treeless ridge of Mount Gorda, twenty-three hundred and sixty feet high, which comes for two and a half miles from the eastward, its extremity meeting the extremity of the former ridge at the gulch of Four Mile Creek, six hundred and fifty yards south of the cape. This gulch is filled with redwood, and all the minor gulches with oak and deciduous trees. The seaward front of the cape attains eight hundred and nine hundred feet elevation within four hundred yards of the ocean, and the pitch of it is a small spur one hundred and forty feet high only fifty yards from the sea. A narrow strip of sand, up to twenty feet elevation, borders the cape for one and a half miles south, and two and a half miles northwest to the Mattole River. Outside of this a line of hundreds of rocks and rocky islets reaches from three hundred and fifty to six hundred yards off shore.

The more prominent of these *dangers* are *Gorda Rock*, which lies eight-ninths of a mile directly south of the pitch of the cape, and twelve hundred yards broad off Four Mile Creek Gulch. This is a very small conical rock, sixteen feet above the sea, and has fifteen fathoms of water close under its south side. The sea generally breaks over it. Its length lies west-northwest and east-southeast. There is deep water close around it. The Coast Survey steamer has passed between it and the land in a heavy northwester, but kept as close to the rocks as was prudent. It lies in the track of the smaller coasting steamers which run close under the land in thick weather or when there is a heavy swell. The nearest rocks inside of it lie four hundred yards off the shore, and the three outer ones of these are from fifteen to twenty-five yards in extent, with a *sunken rock* seventy-five yards southeast of the middle one. Another *sunken rock* lies five hundred and eighty yards broad off the shore, one and one-eighth miles southeast of the pitch of the cape, and five-sixths of a mile east half south (E. ½ S.) from Gorda Rock. Half way between it and the shore are three or four moderately large rocks above water and a break between the two outer ones.

Conical Rock is a marked feature three hundred yards northwest by west three-quarters west (NW. by W. ¾ W.) from the pitch of the cape. It is fifty yards in extent, nearly circular, and rises to almost twenty feet above the sea. Three hundred and fifty yards west by north half north (W. by N. ½ N.) from this rock lies a low rock twenty-five yards in extent, and between them is a large area of breaks. Eight hundred and forty yards north thirty-nine degrees west (N. 39° W.) from Conical Rock is a single *sunken rock* lying six hundred yards broad off the shore. Further to the northward from Conical Rock for one and one-third miles, the shore is bordered by rocks close inshore, but a *sunken rock* lies nearly four hundred yards from shore one and one-fifth miles north eighteen degrees west (N. 18° W.) from Conical Rock.

The geographical position of the Conical Rock off Punta Gorda, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	40° 15′ 38″.5 north.
Longitude	124 21 43″.3 west.
Or, in time	8h 17m 26s.9.

The magnetic variation was 18° 05′ east in January, 1885, and it increases 0′.9 annually.

From the Conical Rock off Punta Gorda the bearings and distances to prominent objects are as follows:

Point Arena Light-house	S. 36½° E.	83½ miles.
Point Delgada [Shelter Cove]	S. 60° E.	19¾ miles.
Cape Mendocino Light-house	N. 28° W.	11 miles.
Blunt's Reef (10-feet sunken rock half a mile SE. by S. of reef)	N. 40° W.	11¾ miles.

Hydrography broad off Point Gorda.—The soundings show that at a distance of one mile from the shore the depth of water is twenty-five fathoms over a bottom of gravel and broken shells; at two miles, thirty seven fathoms over fine gray sand; at three miles, fifty-four fathoms, fine gray sand; at four miles, sixty-eight fathoms over coarse sand, and at this depth there is green mud to the northward and fine gray sand to the south; at five miles, one hundred and two fathoms over blue mud and fine gray sand, and at six miles, one hundred and seventy-five fathoms.

Point Gorda.— Wind and Currents.—The wind, sea, and the currents off Point Gorda are probably as strong as off any point on the coast, and frequent and strong current rips are noticed. It is frequently called Windy Point. Abreast of the cape, and extending to the westward, the one-hundred fathom plateau, marked by rocky bottom, stretches six miles to the mouth of the Mattole Submarine Valley.

This cape was named Punta Gorda on the early Spanish charts. On English charts it was called Delgado Point. In Tebenkoff's Atlas of Charts it is called Cape Delogardo (or Delegardo). The present name is apt and descriptive, "Gorda" meaning great, and rounding.

PUNTA GORDA TO CAPE MENDOCINO.

From Punta Gorda, Cape Mendocino bears northwest by north half north (NW. by N. ½ N.), and the distance between them is eleven miles; the shore-line recedes to the eastward of that course one and one-quarter miles. The hills immediately back of the coast-line are not so high as those south of Point Gorda; they are bare of timber and generally bordered by stretches of low, narrow, and sandy flats, outside of which lies a narrow, low-water beach, rocky in many places. The outlying rocks and breaks are not more than two-thirds of a mile from shore until within one and a half miles of Cape Mendocino, where they begin to reach out farther and culminate in the visible rocks of Blunt's Reef, which lies nearly two and three-quarters miles broad off the cape.

The dangers off the shore just north of Punta Gorda have been mentioned. From half a mile north of the point the compact shore is bordered by a broad, sandy beach for over a mile, with sand dunes rising to one hundred feet at one mile from the point, and numerous rocks inside of and reaching about one hundred yards beyond the low-water line.

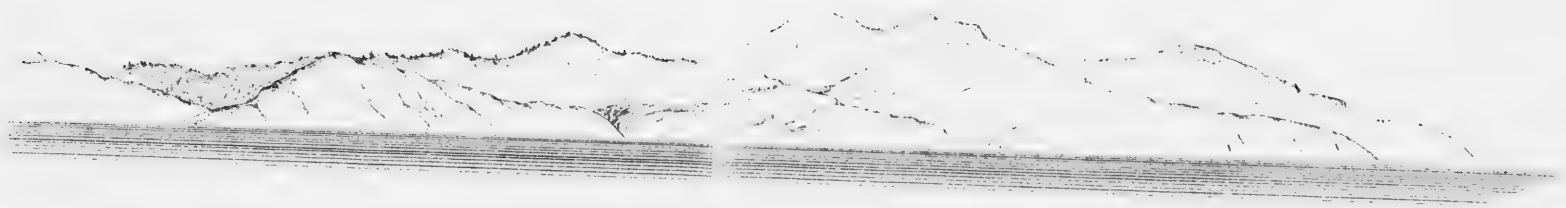
Mattole River is a small stream opening on the coast two miles north of Punta Gorda, through a valley one-third of a mile wide filled with sand-flats. It rises abreast of Shelter Cove, runs parallel with the coast line only four or five miles inland, and after making a sharp curve north of its mouth bursts through the mountains of the coast. The river does not always break through the beach; the mouth generally closes about July and opens about November, and at the time of the topographical survey the narrowest part of the beach between it and the ocean was fifty yards wide at high water. The north head is three hundred and sixty feet high and bare; the south head is nearly as high, but has oak trees inside its lower flank.

Upon the sides of the hills in lower Mattole Valley, and not more than a mile from the coast, springs of petroleum were discovered in 1861. The town of *Petrolia* is located at some of these springs. Along the course of the stream are large areas of bottom land under cultivation, and great herds of sheep are on the hillsides.

On some English charts the name of this river is laid down as R. des Marons, evidently of the same origin as the Marone River of Tebenkoff, who places it in latitude 40° 07′. Mattole is an Indian name (of two syllables), and it is likely to have been pronounced or understood as Marone by some persons.

Mattole River.—Landmark, Sand Dune.—The sand dune on the south side of the entrance to the valley is a well known landmark, because there is no other in this region as far south as Ten Mile River.

Mattole Anchorage.—The Davidson Inshore Eddy Current.—The anchorage off the mouth of the Mattole River is foul, but may be used under stress of circumstances both in northwesterly and southeasterly weather.



Punta Gorda, SE., 14½ miles.

Rock white on S. side.

Sugar Loaf, 331 feet.

Cape Mendocino Light-house, E. ¼ S., 5 miles.

Rock off Cape Fortunas, 216 feet.

Cape Fortunas, N. ¼ E., 11 miles.

Sugar Loaf, 331 feet.

Cape Mendocino Light-house, N. by E. ¼ E., 7 miles.

When the Coast Survey steamer has been anchored here in a heavy northwest swell, with a light southeast breeze a quarter of a mile inside the ship, she has found a strong northwest wind at the anchorage. The vessel would be rolling heavily in the heavy northwest swell and riding to a current from the southeast running one to two knots.

In November, 1884, the set of the current to the northwestward was so strong as to keep the kelp well under water and out of sight. Two weeks later the kelp was thick on the surface of the water while there was a heavy swell from the southwest with the sea breaking in ten fathoms of water.

When the tug has been anchored off the Mattole River to discharge freight, she has tended to a set of the current to the northward against a strong northwest wind and swell.

A *sunken rock* lies seven hundred yards off shore one mile north of the Mattole River. It bears north eleven and a half degrees west (N. 11½° W.) two and one-seventh miles from the Conical Rock off Punta Gorda. Inside of it there is a rock above water, sixty yards in extent and three hundred yards off shore.

Sea-Lion Rock, twelve feet high and fifty yards in extent, is the largest and southernmost of a cluster of seven rocks covering a space of one hundred and fifty yards. They lie a little over half a mile from shore and bear north sixteen and a half degrees west (N. 16½° W.) three and three-quarters miles from the Conical Rock off Punta Gorda. Inside these rocks nearly half-way to shore, lies a *sunken rock*, and then low rocks and rocky islets stretch out four hundred yards from the shore line.

A broad, sandy flat, with sand dunes under the precipitous mountain sides, begins abreast of Sea Lion Rock and stretches four miles to the northwestward. The coast hill immediately abreast of this rock reaches an elevation of nine hundred and fifty feet in not quite half a mile from the shore. It is bare of forest trees on its seaward face except in the gulches, but has a dense growth of redwood and oak on its northern slope.

Double Rock, consisting of two small rocks close together, lies eight hundred yards off shore nearly half a mile northwest from Sea Lion Rock. The two rocks are about twelve feet high and thirty and twenty yards in extent, respectively. From the Conical Rock off Point Gorda they bear north nineteen degrees west (N. 19° W.) four and one-tenth miles.

Rocks border the shore outside the sand dunes for one and a half miles to *Mussel Ledge*, a rocky projection stretching four hundred yards to the southwestward from the shore-line, with a black rock on the same course on the broad, sandy beach two hundred yards inside the same, and which is a very conspicuous object to vessels close off Cape Mendocino.

Devil's Gate Rock.—For a description of this rock, which lies off the northern end of the four-mile stretch of sand beach mentioned above, see Dangers under Cape Mendocino.

There is a great number of rocks inside the Devil's Gate Rock under the shore, and some extending six hundred yards seaward. They are so numerous that they can not be described in detail. There is a narrow, skirting drift of sand, about twenty feet high and from twenty to one hundred yards wide, along the shore. The mountain sides are steep and treeless and cut by deep gorges; that between the Devil's Gate Rock and Steam-boat Rock is called the Devil's Gate.

HYDROGRAPHY OF THE COAST FROM SHELTER COVE TOWARDS CAPE MENDOCINO.

The general character of the hydrography along this part of the coast exhibits the one-hundred-fathom line of soundings at a distance of about six miles from the shore; and this may for reference be considered the marginal plateau.

But the recent hydrographic examination has developed the existence of several deep submarine valleys which cut through the marginal plateau and head close under the mountainous coast-line.

The Tolo Bank is found with only eight to twenty fathoms of water four miles off shore, just to the southward of Point Delgada.

The Delgada Submarine Valley.—A deep submarine valley is found the same distance westwardly from the point, and running almost due north directly into the coast-line under King Peak. This mountain is four thousand two hundred and sixty-five feet high, and only two and a half miles north from the shore line; the head of the submarine valley is one hundred fathoms deep at a mile and a quarter from the shore, while the twenty-five-fathom depth is almost at the rocks under the cliffs. King Peak is on the prolongation of the axis of this deep valley, which runs

almost north and south. The ordinary one-hundred-fathom line of soundings lies six miles off Point Delgada, but at seven miles from shore in the bight north of the point, the submarine valley reaches a depth of four hundred fathoms south sixty-four degrees west (S. 64° W.) from the point.

Hence to Point Gorda the one-hundred-fathom line of soundings continues nearly parallel with the coast-line, except about midway where a minor submarine valley, from three hundred to one hundred and fifty fathoms deep, stretches sharply towards the shore and within two and a half miles thereof. It lies about two and a half miles south by east (S. by E.) from Spanish Flat.

Abreast of Rodgers' Break the twenty-five-fathom line of soundings is not quite two miles off shore, and the one-hundred-fathom line is three and three-quarters miles out. The descent from one hundred fathoms is very sharp. Along the whole sea-board, the general ten-fathom line of soundings is not more than half a mile from shore and outside the line of dangers, so that the use of the lead must be quick and continuous to prevent a ship from running into dangers.

West-southwest from Point Gorda the line of one hundred fathoms stretches out more than six miles, although the thirty-fathom line is only one and one-third miles from the point. The character of the bottom on this slight submarine ridge outside of Point Gorda is different from that further south or north. The ten-fathom curve is less than half a mile from shore, with a bottom of fine gray sand, coarse gravel, and broken shells. The twenty-fathom line is not quite one mile from the point, with a bottom of broken shells, gravel, and sand; and on the line of twenty-two fathoms there are a few patches of kelp reaching out to twenty-nine fathoms, rocky bottom, at one and one-third miles west by north (W. by N.) from the point. The line of thirty fathoms is less than one and a half miles off, with bottom of gravel and broken shells. At one and three-quarters miles, in thirty-five fathoms, the bottom is fine gravel and broken shells. The fifty-fathom line is three miles off, over rocky and coarse gravel bottom. The seventy-fathom line is five and a half miles off, over bottom of rocks, broken shells, and small patches of green mud.

It is thus seen that the line of green mud is here removed as far out as seventy or eighty fathoms, instead of forty, to the north and south.

Point Gorda Submarine Valley.—Immediately north of this cape a very deep submarine valley comes in from the southwest by west half west (SW. by W. ½ W.), and heads close under the shore three miles north of Point Gorda, and therefore less than a mile north of the mouth of Mattole River.

The head of this great submarine valley, at the thirty-fathom line, is only one-third of a mile from shore in latitude 40° 18¾′ north. The one-hundred-fathom line is one and a half miles from shore, and the sides are remarkably steep, the one-hundred-fathom curves coming close between the thirty-fathom lines on the north and south, where the latter are only one-third of a mile apart.

The opening of this valley, in five hundred and twenty fathoms, lies only six miles south sixty-two degrees west (S. 62° W.) from Point Gorda, and is therefore inside of the one-hundred-fathom line immediately to the southward. The barrier of coast mountains at the head of this valley is over two thousand feet high.

Cape Mendocino Submarine Valley.—Between Punta Gorda and Cape Mendocino lies a second submarine valley, a little nearer the cape. It comes in from the westward, but does not indent the general twenty-fathom line. The one-hundred-fathom line, which is only a third of a mile outside the twenty-five-fathom line, is just two miles off the shore-line, and five miles south fifteen degrees east (S. 15° E.) from Cape Mendocino Light. The four hundred and fifty fathom sounding in the entrance to the valley is only six and a half miles south thirty-three degrees west (S. 33° W.) from the Light. This valley is comparatively broad. Its north side is formed by the thirty-fathom plateau extending five miles from Cape Mendocino. The bottom of the valley is green mud, and yet in two places, at three hundred and twenty fathoms, broken shells were brought up with gravel. Both slopes of the valley are green mud up to about thirty-five and thirty fathoms, when the bottom is fine gray sand. Inside of twenty fathoms the bottom is coarse gravel and rocky.

Between the two submarine valleys of Punta Gorda and Cape Mendocino the ridge carries fifty fathoms out to four and one-quarter miles from shore. The bottom is green mud outside of thirty-five to forty fathoms, with fine gray sand inside to the ten-fathom line, which is half a mile from shore, and which, in general terms, is the outer limit of the kelp lying in broken patches along the shore.

Northward of the Mendocino Submarine Valley the irregular bottom off Cape Mendocino stretches well outside of Blunt's Reef, and is described elsewhere.

The existence of these great submarine valleys adds serious difficulties to the steamers working close along shore in thick and foggy weather. The steamers *Active* and *Shubrick* were wrecked [illegible] north of the head of the Point Delgada Submarine Valley, and it is a matter of record that the latter was seeking to get hold of the land to follow it, and reported sounding in deep water without finding bottom, then suddenly coming upon rocks and striking. The mystery that hung over this case is readily solved when we follow the line of the valley, which a vessel would naturally do in attempting to get hold of the land after believing she had passed Point Delgada.

These deep submarine valleys must also exercise an influence upon the ocean fauna of the region where they come so close to the coast-line; and it is quite likely that they have some influence upon the inshore eddy current.

CAPE MENDOCINO.

This mountainous headland is the famous landmark of the old Spanish navigators and the galleons from the Indies. It forms the western limit of the northwest trend of the coast from Point Reyes. It is ninety-three and a half miles north thirty-five and a half degrees west (N. 35½° W.) from Point Arena Light, although the direct course is blocked by Punta Gorda. From this cape to Cape Flattery, at the Strait of Fuca, the general trend of the coast is north-northwest.

Here the range of bold coast mountains from the southward appears to meet a range from the eastward, forming ridges of two thousand feet elevation within a mile of the coast, and three thousand feet within four miles.

This great projection is the latitude of much climatic change; the winds do not blow home so violently in the bight to the southward of it, and there is no great windgap in the mountain barrier hence to Russian River and Bodega Bay, except over the Ten Mile River beach. The winter rains decrease greatly in amount of precipitation and violence to the southward of it and increase to the northward; and it is not improbable that the broad coast-current from the north may be affected by it.

The seaward face of the cape is steep, rocky, and water-worn towards the shore-line; above the Light-house the general appearance is rolling and grass-covered except in the deep ravines and upon some of the steep hillsides where the northern exposure is covered with forest or brush.

The great Cape Ridge stretches from the cape with curving crest-line about three miles to the east-northeast, and attains an elevation of thirteen hundred and sixty feet; and the great irregular ridge from the east-southeast comes from an elevation of twenty-two hundred and forty feet to within a half mile of the south side of the cape.

For eight miles the shore to the northward of the cape runs almost exactly north, only partly broken by Cape Fortunas or False Cape. To the southeast the high, bold shores run for six miles and then bend outward for five miles to Punta Gorda. Half a mile east-southeast from the point of the cape a small stream, issuing from between the two great ridges forming the cape, opens at the north end of a broad sandy level, known as Singley's Flat, which is over one-quarter of a mile wide and runs for one mile to the southeast along the base of the coast ridge. This flat is bordered by a broad sand beach at low water, but is just as well fringed with rocks and breaks as the rockier shores.

The well marked and regularly shaped haystack rock immediately off the pitch of the cape, and known as the *Sugar Loaf*, is a readily distinguished feature in approaching the cape from all directions seaward. As seen from the southwest it shows a cave on its southwest face extending upwards nearly one-third the height of the rock. This great rock is three hundred and [illegible] one feet above the sea and bears south fifty-eight degrees west (S. 58° W.) six hundred and forty yards from the Light-house. It is nearly round, its longer axis being two hundred and seventy yards, and its shorter axis two hundred and twenty yards. The distance between it and the cape is only two hundred and forty yards and this space is filled by a bar of great rocks bare at low water. In 1872 there was a heavy line of sand and shingle among these rocks, connecting the cape with the islet and passable on foot at low tide, but the face of the islet was too steep for ascent.

Vessels out of their reckoning and making this rock in a fog may readily distinguish it from the large rocky islet off Cape Fortunas, or False Cape. The latter is two hundred and sixteen feet

high, or about two-thirds the height of the former, and is not so regularly shaped. From the southwest the Fortunas Rock shows two indifferently marked white and narrow tops, having from that direction only about one-third the diameter of the Sugar Loaf. From the west or northwest the Fortunas Rock shows two other large rocks, ninety and forty six feet high, immediately inside of it, whereas the Sugar Loaf stands solitary and compact. Formerly the Sugar Loaf was sometimes known as the Haystack.

Dangers.—Besides other characteristics, Cape Mendocino is noted for having a small but very dangerous ledge, bare at all tides, lying two and three-quarters miles broad off it, and known as *Blunt's Reef.** It consists of two black rocks, two hundred and thirty yards apart with fifteen fathoms of water between them and a heavy breaker upon each. The larger and outer breaker bears south eighty-one and a half degrees west (S. 81½° W.) two and seven-eighths miles from the Light house on the cape; the smaller, a short distance to the northeast, bears south eighty three degrees west (S. 83° W.) two and five sixths miles from the Light.

This reef was noticed by Vancouver as being about one league off shore. (Vol. I, page 198.)

For many years the passage between the reef and the cape was generally used by the coasting steamers and lumber vessels, but the examinations of 1870 and 1872 have shown the passage to be a very dangerous locality, and the insurance companies will not underwrite vessels using it.

Between the reef and the cape the depth of water ranges from nine to seventeen fathoms over foul bottom, although to the north and south the bottom is fine sand, mud, and gravel.

Whistling Buoy off Blunt's Reef.—A *first class whistling buoy*, painted with black and white perpendicular stripes, has been placed (1885) off Blunt's Reef in twenty-five fathoms of water over rocky bottom. It is situated four-fifths of a mile south eighty-one degrees west (nearly W. by S.) outside Blunt's Reef, on the range of the south rock of the reef and Cape Mendocino Light.

The strength of the sound depends upon the roughness of the sea. In ordinary smooth water the sound can be heard at a distance of a mile; in a heavy sea much farther, but depending largely upon the direction of the wind. The blasts are less than half a second long, and there may be from twenty to thirty per minute.

From the buoy we have the following bearings and distances to important points:

Whistling Buoy off Humboldt Bar	N. 11° E.	22 miles.
Cape Mendocino Light-house	N. 81° E.	3⅞ miles.
The Great Break, south of Blunt's Reef	S. 5° E.	1⅛ miles.
Rock off Punta Gorda	S. 41 E.	13 miles.

Dangers.—In 1870, while we were determining the latitude and longitude of the Light-house, there occurred quite a low tide with a very large swell from the west-northwest without any wind. Under these circumstances we obtained the direction of *seven breaks*, and approximately located their distance. In the winter of 1872–'73, after the hydrographic survey, during a special watch of one month's duration, in which time there occurred several southerly gales with heavy southwest swell, an experienced observer detected other breaks, and also saw the water break in two localities where, after an especially close search, the survey had developed nothing less than nine fathoms of water. These were not breaks on single rocks, but breaks over moderately large areas.

All these dangers have been located with precision (1872–'73), and the whole vicinity thoroughly sounded from the deeper water to within the ten fathom line, and in large measure to the five and six fathom lines. Outside of Blunt's Reef the soundings were carried to the twenty-five and thirty fathom lines.

These dangerous rocks, above water, awash, and sunken, are as follows:

The Devil's Gate Rock.—This is a low, pyramidal rock, twenty feet high and twenty yards in extent, with a smaller rock close under the northwest side. For two hundred yards to the west by north (W. by N.) from it there runs a line of sunken rocks upon which the sea breaks in ordinary swell. The main rock lies half a mile off shore, two and two-thirds miles south thirty-eight and a half degrees east (S. 38½° E.) from the Sugar Loaf off the cape, and south thirty and a half degrees east (S. 30½° E.) two and two-thirds miles from the Light-house.

As already stated, there is a number of rocks inside the Devil's Gate Rock under the shore, and some stretch six hundred yards from the shore. They are so numerous that they can not be described in detail.

*Named "Blunt's Rocks" by the Coast Survey in 1850 after Capt. Simon Blunt, U. S. Navy.

Steam-boat Rock is a large and noticeable rock lying six hundred yards off the shore and one and one-half miles south twenty-three degrees east (S. 23° E.) from the Light-house. It is one hundred yards long, east and west, by fifty-five yards broad, and rises in a low pyramid in the middle, where it is forty-six feet above the sea, with each end slightly raised. The lower part is black and the upper part white. The appearance of this rock is very much like a steam-boat, with long, low, black hull and whitish upper works, and hence its name.

Between Devil's Gate Rock and Steam-boat Rock lie very many rocks, above and below water, and extending as far as three hundred and twenty yards off shore.

The Outer Break.—This is named from its relation to the Steam-boat Rock. It is the outer one of four sunken rocks lying nearly half a mile southwest by south (SW. by S.) from Steam-boat Rock and three quarters of a mile broad off shore. The inner rock of the four is half-way to Steam-boat Rock. The outer one lies south ten and a half degrees east (S. 10½° E.) one and four-fifths miles from the Light-house. It breaks continually. Soundings at eighteen fathoms are laid down two-fifths of a mile seaward, but none closer. These rocks are not marked by kelp.

*The Northerner** or *Two fathom Rock* is the highest point of a *sunken ledge* of seventeen and eighteen feet of water lying south six and a half degrees west (S. 6½° W.), one and two fifths miles from the Light-house and four fifths of a mile off shore. It is on the outer edge of the ten-fathom curve, with depths of nine to thirteen fathoms close around it. There is no kelp upon it.

Inside the Two-fathom Rock, and three hundred and thirty yards towards the Light-house, lies a *large rock awash* at high water. It bears south four and a half degrees west (S. 4½° W.) one and one tenth miles from the Light-house and is six hundred and twenty yards off shore, with visible rocks inside of it.

Still nearer the Light-house, and bearing directly south, one mile from it, is one of *three rocks awash at low water.*

The *Seven-feet Rock* is the middle one of three *sunken rocks*, of which the outer one lies south twenty-six degrees west (S. 26° W.) one mile from the Light-house. The Seven-feet Rock lies about seventy-five yards northeast (NE.) from the outer one, with four fathoms between them; and the inner rock is two hundred and twenty yards north seventy-two degrees east (N. 72° E.) from the outer one, with six fathoms between it and the Seven-feet Rock.

The outer rock exhibits the same peculiarity as the Fauntleroy Rock in its breaking; a sharp breaker with the spray shooting straight upward. Stiff, black sea-grass, or short kelp, growing on the top of the inner rock has been seen in a heavy swell. No kelp marks these rocks.

The Fauntleroy Rock.—This is a *sunken bayonet rock* lying nearly in mid-channel between the cape and Blunt's Reef, but three-quarters of a mile south of the line joining them. From the Light-house it bears south fifty-two and a half degrees west (S. 52½° W.) distant one and two-thirds miles. It has only six feet of water upon it; close alongside of it are nine and ten fathoms of water, deepening rapidly to fifteen fathoms. The ranges for noting this danger are the Light-house over the middle of the southern slope of the Sugar Loaf, half-way between summit and base, and the point of land at Centreville showing half-way between the extremity of False Cape and the nearest and smallest of the three rocks lying immediately off it. The outer edge of the woods upon the point of land at Centreville is in range with the extremity of False Cape.

The "point of land at Centreville" here referred to is the northern extremity of the high, bluff shore-line, four and a half miles to the northward of False Cape, near which is located the town of Centreville.

The sea very seldom breaks upon the Fauntleroy Rock even when all the others exhibit breaks. When it does, the break is quite sharp and well defined, and the white water shoots straight upward.

This rock was not found in the survey of 1872, but the break upon it was seen and determined by the observer stationed on shore during the prevalence of winter storms in the following month of December. In 1875 it was sounded upon when the top of the rock was plainly visible and appeared to be about two or three feet in diameter. There is no kelp upon or around it.

We believe this is the rock which was first distinctly seen under the wheel of the steam-ship *Commodore* in 1857 as she was passing through the channel, when its location was only approximately ascertained. The first direct information that such danger existed was doubted by most ship-masters, and on account of the constant disregard of this reported danger the steamer *Northerner* was lost upon another of the sunken rocks in 1860.

* See page 315.

The "Great Break."—This sunken rock has four and a quarter fathoms upon it and the sea does not break upon it at half-tide and very seldom at low water; but under the circumstances we have mentioned as occurring in 1870 it broke very heavily, and with an upward rise, as if the rock was vertical and faced square to the west-northwest swell. It lies south sixty-seven and a half degrees west (S. 67½° W.) three and one-twelfth miles from the Light house, and three-quarters of a mile south three and a half degrees east (S. 3½° E.) from the southwestern one of the two visible rocks of Blunt's Reef. It is not marked by kelp.

The Ten-feet Rock lies just east of the line between the Great Break and Blunt's Reef. From the Light-house it bears south seventy-two and a half degrees west (S. 72½° west) distant two and three quarters miles; and from the southwestern one of the Blunt's Reef rocks it bears south twenty-nine degrees east (S. 29° E.) distant one half mile. It is not marked by kelp.

In our first observations upon this break in 1870 we thought we made out three breaks, one being a little to the northward and the other a little to the southward of this. They did not break frequently. The spot where the ten-feet depth is located has thirteen and fourteen fathoms close around it; and two hundred and fifty yards towards Blunt's Reef there is a sounding of eight and three quarters fathoms, surrounded by fourteen and fifteen fathoms. There is, therefore, a bare possibility that another rock than the ten-feet danger may be undiscovered.

The Thirteen-feet Rock.—This *sunken rock* lies south seventy-five degrees west (S. 75° W.) one and one-tenth miles from the Light-house, and appears to be an isolated *bayonet point* surrounded on all sides by thirteen fathoms of water. It is nearly three-quarters of a mile outside the ten fathom line. It is not marked by kelp.

Inside the Thirteen-feet Rock, and just within the ten-fathom line, are *two sunken rocks* but no depth of water is given. They are one hundred and ninety yards apart west-northwest (WNW.) from each other. The outer lies a little more than four-fifths of a mile south seventy-eight degrees west (S. 78° W.) from the Light-house, and is on the range with the north tangent of the Sugar Loaf and the light-keeper's dwelling. It gives a distinct and well-defined breaker. The inner one is a little less than four-fifths of a mile from the Light-house, and the top has been seen in the trough of the sea during a heavy swell.

A Rocky Ledge lies two hundred yards inside the ten-fathom line, and the sea is almost constantly *breaking* upon it in two places. The southeastern point of the break is awash at low water and lies on the range of the southern edge of the Sugar Loaf and the Light-house. It bears south fifty-one and a half degrees west (S. 51½° W.) distant almost two-thirds of a mile from the Light-house. The northwestern point of the break, one hundred and thirty yards from the former, bears south fifty-four degrees west (S. 54° W.) seven-tenths of a mile from the Light-house.

A Sunken Rock, showing a break at low water, was observed on the bearing south seventy degrees west (S. 70° W.) from the light-keeper's dwelling at an estimated distance of three-quarters of a mile from the Sugar Loaf, but should be closer in, judging from overestimates of distances to other breaks. It is not on the chart, and is either an erroneous bearing of the outer point of the rocky ledge just mentioned, or the rock has not been discovered.

The Off Rock is the larger of the outermost visible rocks off the cape, and shows as a low, rounding mass with a sharp point at the inner edge. It is a favorite resort for seals. It lies south eighty-seven degrees west (S. 87° W.) three quarters of a mile from the Light-house. The companion rock lies one hundred yards west-northwest (WNW.) from it.

Four hundred and twenty-five yards inside the Off Rock and almost on the line to the Light house is a cluster of *four small rocks above water.*

The Outer Twin Rock is the outer of two rocks above water, and lies north eighty-two degrees west (N. 82° W.) two-thirds of a mile from the Light house. Its mate, forty yards in extent, and somewhat larger, lies one hundred yards north-northeast (NNE.) from it. Nearly four hundred yards inside these rocks are two smaller ones close together.

Sharp Rock is the highest rock outside the Sugar Loaf. It lies a little over half a mile north sixty-four degrees west (N. 64° W.) from the Light house and one third of a mile broad off shore. It is pointed and shows white at the apex. It can not be mistaken, and shows clear off the cape from the northward and southward.

A Sunken Rock lies nearly three hundred yards outside of the Twins and north eighty-one degrees west (N. 81° W.) four-fifths of a mile from the Light house. It is a constant break, and the position has been well determined, but the depth of water upon it has not been obtained.

Two Breaks, indicating sunken rocks, are shown on the chart just on the ten-fathom line. The outer one is north eighty-one degrees west (N. 81° W.) almost one mile from the Light house. It has ten and three-quarters fathoms close to its position. The inner break lies one hundred and sixty yards to the northeast (NE.) of the former. Both are sharp and well-defined breaks.

Two Low Rocks above water, forty and sixty yards in extent, lie respectively north of the Twin Rocks and Sharp Rock five hundred and seventy-five and six hundred and forty yards distant. The outer one is three-quarters of a mile north fifty-eight degrees west (N. 58° W.) from the Light house and the inner one is half-way towards the shore.

The Twenty two-feet Break lies north of the mid channel one and three-fifths miles from the Light house, and bears north sixty-six degrees west (N. 66° W.) from it. It is the highest point of a limited ledge having from seven to nine fathoms upon it and twelve to fourteen fathoms around it. The locality has very broken bottom. The shoalest water found, three and three-quarters fathoms, is nearly on the range of Sharp Rock and the Light-house and one mile from the former, with Steam-boat Rock open about one-half its length outside of Off Rock. To avoid it, keep the point of land at Centreville well shut in to the eastward of the high rock off Cape Fortunas or False Cape.

The Four Breaks.—After the discovery of the "Twenty-two-feet Break," in the survey of 1872, the observer stationed at the cape in the following December to watch for other breaks saw and determined the positions of *four breaks* in the immediate vicinity of the same. These were large and heavy, resembling ground breakers. The swell was large and long from the westward, and broke also occasionally on the nine fathom patches in mid-channel between Blunt's Reef and the visible rocks inshore. From the Light-house these four breaks lie between the bearings north sixty three degrees west (N. 63° W.) and north seventy-seven degrees west (N. 77° W.), at one and three-eighths to one and five-eighths miles distance. The soundings in this limited area range from fifteen and three-quarters to seven and three-quarters fathoms over a bottom of rock with brown coral, fine gray sand, and gravel. These breaks are close to deep soundings, and no examination has been made to determine the depth of water upon them. There are heavy ground breakers in this locality even where the depth of water reaches nine fathoms.

The Northerner Rock.—On the 5th January, 1860, the steam-ship *Northerner*, under the command of one of the most experienced captains on the northwest coast, struck upon a sunken rock about two miles southward of Cape Mendocino. At the time she was under full steam with all sail set, going twelve knots before a southeaster and a large swell. As her bow sank in the trough of the sea a very slight jar was felt forward and the bottom grated over the rocks. This excited no alarm among the passengers, but the pumps were immediately sounded and the ship found to be making water very fast. She was headed for Humboldt, passed Cape Mendocino making one inch of water per minute with six pumps at work, and was beached three and a half miles northward of Cape Fortunas, where shoal water and uneven bottom in ridges extends out for a quarter of a mile. She went to pieces during the night in a heavy southwest blow and many of her passengers, officers, and men were lost.

From an examination of all the circumstances of this wreck and the information we now have of the dangers off Cape Mendocino, we are convinced the *Northerner* struck on the Two-fathom Rock lying one and two-fifths miles south six and a half degrees west (S. 6½° W.) from the Light-house, and four-fifths of a mile broad off Singley's Flat. (See page 313.)

Heavy deep-water breaks in southeast gales with large swell were seen over those areas west and northwest of the cape that have less than ten fathoms upon them, and also, as mentioned above, on the broken ground two miles south seventy-seven degrees west (S. 77° W.) from the Light house. There appears no doubt whatever of this extraordinary breaking because it was seen on two or three occasions when the westerly swell was very long and very heavy, and the tide low.

SAILING DIRECTIONS FOR CAPE MENDOCINO.

In view of the dangers already described, warnings have been given to navigators to avoid the passage between Blunt's Reef and the cape, and the insurance companies of San Francisco have refused to grant insurance to vessels using the passage. Nevertheless there may arise occasions when a vessel is compelled to make the passage. If she has the Coast Survey chart of Cape Mendocino and Blunt's Reef she can choose her own course and be governed by the emergencies of the case. A rule followed by one of the most experienced pilots on the coast,

when going northward against the heavy northwest winds and swell, is to keep one half mile, and nothing less, outside of all rocks, visible and awash, from Devil's Gate Rock northward until Sharp Rock is on with the Light-house, and thence a course north by west (N. by W.), nothing to the eastward, will clear the dangers off Cape Fortunas or False Cape. That course around the cape will follow the trendings of the shore line at one mile distance. A vessel passing inside of Blunt's Reef, from one-half to one mile distant therefrom, will pass through the mile-wide passage between the Ten feet Rock and the Fauntleroy Rock. The one difficulty in making such a passage is in estimating distances; an error of judgment in such estimates may place the vessel in jeopardy.

Passing to the outside of Blunt's Reef, and from the southward, vessels should have it bearing to the eastward of north when a little over a mile distant to clear the "Great Break," and pass the reef in safety at a quarter of a mile distance to the eastward.

It seems practicable to aid the smaller coasting steamers that are working to the northward against the heavy northwest winds and swell prevailing in summer by placing two or three large channel-buoys in the fairway of the channel inside of Blunt's Reef.

There is no safe anchorage under Cape Mendocino; during the hydrographic survey the steamer anchored off the mouth of Bear River where the bottom is uniform and sandy with patches of brown clay, and there is ample room for getting under way. At one mile from the shore the depth is eight fathoms, and at half a mile six fathoms. The attempt to anchor under the cape was attended with peril; and when the Light-house was being built the material was landed on the little sand beach just under the cape after much delay and at great risk.

The Soundings outside of Blunt's Reef are irregular to thirty fathoms, which depth is found about two miles to the westward. Twenty fathoms of water is found half a mile outside the reef, but a thirteen-fathom lump lies one and one quarter miles from the southwestern rock of Blunt's Reef between the bearings north sixty-five degrees west (N. 65° W.) and north eighty degrees west (N. 80° W.) from it.

Deep sea Soundings.—A short line of deep-sea soundings was run by the U. S. steamer *Tuscarora* on the 30th and 31st of October, 1873. These soundings indicate the existence of submarine mountains even at great depths.

Distance and bearing from Cape Mendocino.	Depth (fathoms).	Latitude.	Longitude.	Temperature (Fahrenheit).	Character of bottom.
Miles. °		° ′	° ′		
7 S. 2 E	72	40 20	124 26	No observations.	Hard, gray sand.
9 S. 3½ W	176	40 19	124 28		Very hard, gray sand
10 S. 13 W	544	40 18	124 30		Hard, gray sand.
12 S. 8 W	601	40 16	124 30		Do
10 S. 20 W	731	40 19	124 32		No specimen.
15 S. 47 W	766	40 21	124 41		Gray sand
25 S. 60½ W	1,166	40 22	124 56		Hard, gray sand.
40 S. 69 W	821	40 25	125 15		Greenish mud and black sand.
47 S. 68 W	930	40 24	125 24		Grayish black sand
65 S. 57 W	1,567	40 11	125 44		Clay ooze.
85 S. 59½ W	2,263	40 09	126 12		Clay and mud.

At the last location the bark *Amethyst* reported the shock of an earthquake December 1, 1870.

Beyond these outer soundings we have had (1869) a report of shoaler water over a bottom of green ooze and sand, with strong current rips, etc., but we have placed no reliance upon it.

The *currents* off Cape Mendocino about the vicinity of Blunt's Reef were estimated at one mile per hour, but no regular series of observations was undertaken.

When nearly becalmed for several days about fifteen miles to the northwest and west-northwest of the cape in September, 1870, with however just enough air to give steerage way, we experienced a set of the current to the northward of not less than one and one-quarter miles per hour. When the wind increased to give the vessel two and a half miles per hour, we gradually worked to the south southeastward and crossed a well marked current rip fifteen miles from the cape. Inside of this current rip the current was setting to the northward; outside of the rip the current was setting to the southward. The prevalence of calm weather and a smooth sea for

full week had given the eddy-current close under the shore a chance to develop its full force and width. All the conditions were favorable for ascertaining the above facts.

When the northwest winds are strong, and the swell heavy, it is quite likely that this inshore eddy current is crowded back, or works its way northward along shore as a subsurface current. Under ordinarily favorable circumstances it is very probable that it does not exceed one or two miles in breadth.

When passing down this coast in 1786, between latitudes 40° 38′ and 36° 58′, La Pérouse appears to have been carried thirty miles to the southward by the current, and also a little off shore. This off shore current has often since been experienced by navigators well acquainted with the coast.

The Tides.—The Corrected Establishment, or mean interval between the time of the moon's meridian transit and the time of high water, is X^h 50^m. The mean rise and fall of the tides is three and nine-tenths feet; of spring tides, four and eight-tenths feet; and of neap tides, three feet. The mean duration of the rise, reckoning from the middle of one stand to the middle of the next, is 6^h 15^m; of the fall, 6^h 10^m; and of the stand, 40^m. The average difference between the Corrected Establishment of the a. m. and p. m. tides of the same day is 1^h 27^m for high water, and 0^h 46^m for low water. These differences when the moon's declination is greatest are respectively 2^h 05^m and 0^h 56^m. The average difference in height of these two tides is one and four-tenths feet for the high waters, and two and eight tenths feet for low waters. When the moon's declination is greatest these differences are, respectively, one and nine-tenths feet and four feet. The average difference of the higher high and lower low waters of the same day is six and seven-tenths feet, and when the moon's declination is greatest, seven and one-tenth feet. The rise of the highest tide observed was eight and three-tenths feet above the plane of reference, and fall of the lowest below the same plane one and one-half feet; or a total range of nine and eight-tenths feet.

LIGHT-HOUSE AT CAPE MENDOCINO.

The tower of this Light stands on the outermost pitch of the cape about four hundred feet above the sea, and the ridge rises eight hundred feet above it in two-thirds of a mile on a line from the Sugar Loaf. It is a frustum of a sixteen-sided pyramid, twenty feet high from base to focal plane, constructed of iron, painted white, and surmounted by a lantern and illuminating apparatus of the first order of the system of Fresnel. The dome and balustrade of the lantern are painted white. A dwelling for the keeper is situated fifty yards east southeast from the Light house; it is a two-story wooden house, painted a light bluff color. A small house for temporary sleeping quarters is built on the north side and close to the Light-house. The old dwelling, of brick, which was situated two hundred and ten yards southeast by east from and forty feet higher than the Light, was cracked by an earthquake in 1871 and subsequently removed.

The Light was first exhibited December 1, 1868, and shows from sunset to sunrise a *revolving white light with a flash every half minute.* The *duration of the flash is five seconds*, and of *the obscuration twenty-five seconds* by our observations from seaward. The former announcements gave a partial obscuration of five seconds before and after the flash; this may be visible under some circumstances, but the present official announcements do not refer to them.

The Light has an arc of visibility from north seven degrees west (N. 7° W.), inside Cape Fortunas or False Cape, round by west and south to south twenty-three degrees east (S. 23° E.) to Punta Gorda; it can be seen off the Humboldt Bar.

The focal plane of the lens is four hundred and twenty-three feet above the mean level of the sea, and the Light should be seen under favorable conditions of the weather from a height of—

10 feet at a distance of 27.3 miles.
20 feet at a distance of 28.8 miles.
30 feet at a distance of 29.9 miles.
60 feet at a distance of 32.5 miles.

The geographical position of the Light, as determined by the Coast and Geodetic Survey, is:

Latitude	40° 26′ 18″ north.
Longitude	124° 24′ 21″ west.
Or, in time	8^h 17^m 37^s.4

The computed magnetic variation for January, 1885, was 18° 12′ east, with an annual increase of 0′.9.

From Cape Mendocino Light we have the following bearings and distances to prominent or important objects:

Blunt's Reef, Southwest Rock	S. 81½	W.	2.9 miles.
Point Arena Light-house*	S. 37½	E.	94½ miles.
Point Cabrillo*	S. 40½	E.	70¾ miles.
Punta Gorda	S. 29	E.	11 miles.
Cape Fortunas or False Cape	N. 7½	W.	4½ miles.
Whistling Buoy off Humboldt Bar†	North		21 miles.
Humboldt Light-house	N. 3½	E.	21½ miles.
Trinidad Light-house†	N. 1	W.	38 miles.
Redding's Rock	N. 8½	W.	55 miles.
Crescent City Light-house	N. 12	W.	78 miles.
St. George's Reef‡ (proposed light-house)	N. 17	W.	83 miles.
Cape Orford Light-house	N. 21	W.	144 miles.
Whistling Buoy off Blunt's Reef to Whistling Buoy off Humboldt Bar	N. 11	E.	22 miles.

See description of Blunt's Reef for Whistling Buoy off Cape Mendocino.

The extent of shore-line from Point Boneta to Cape Mendocino is about two hundred and twenty-four miles, without reckoning the minor indentations.

CAPE MENDOCINO.—CLIMATIC CONDITIONS.

At Point Concepcion great changes were found to exist in the character of the winds and swell, temperature of the water, etc., on account of the great change of direction of the coast-line. Equally interesting differences are found in the latitude of Cape Mendocino. This great headland marks the second change in the general direction of the coast-line. From Point Concepcion the trend of the coast is nearly northwest true; north of Cape Mendocino the trend is nearly north true hence to Cape Flattery. To the southward of Cape Mendocino there is a fair extent of forest land, but to the northward the country may be said to be wholly wooded. Southward of Cape Mendocino the two thousand to twenty-four-hundred fathom plateau of the Pacific Ocean comes relatively close under the coast, the former depth being less than forty miles outside Point Arena; northward of Cape Mendocino, in the latitudes of Trinidad and Point St. George, the distance is four times as great and the bottom is very irregular.

The temperature of the ocean water along the coast, as derived from a limited number of observations through two years, has nearly the same yearly average of 54° Fahr. as the waters to the north almost as far as the Strait of Fuca.

But the distinguishing feature of this part of the coast is the large increase in the rain fall upon the sea-board, upon the coast range, and as far as the western flanks of the Sierra Nevada. The seasons are the same as at the southward, dry in summer and wet in winter. From eleven years' observations at Eureka, from 1863 to 1873, the rain-fall averaged thirty-two and a half inches, reaching forty seven and a half inches in 1866, and falling to twenty-five and a half in 1869 and 1873. The condensed table is given under the description of Eureka. The published bulletins of the Signal Service give a rain-fall of twenty-seven and three-quarters inches at Cape Mendocino, but this is for the year 1885–'86.

The winds blow with severity off the cape, and in southeasters the register has indicated a velocity as high as one hundred and forty-four miles per hour (on January 20, 1886), but it does not necessarily follow that it attains this extraordinary velocity immediately over the water. In twenty-four hours, on January 26, 1886, the register indicated fourteen hundred and seventy miles, or sixty-one and a half miles per hour for the entire day; and for thirty days of the same month, January, 1886, the register indicated fifteen thousand seven hundred and thirty-six miles, which is an average hourly velocity for a whole month of nearly twenty-two miles.

The great swell of the Pacific in heavy southerly weather causes the sea to break in nine and even nine and one-quarter fathoms of water off the cape, and even in prolonged northwest winds the long, deep, rolling swell is very heavy.

* Punta Gorda breaks the direct line of vision, but from Blunt's Reef the bearing is open.

† Cape Fortunas breaks the direct line of vision, but from Blunt's Reef the bearing is open.

‡ The northwest or outermost of the Dragon Rocks, or Crescent City Reef, where a light-house is in course of construction. The name first adopted was the Northwest Seal Rock Light.

The fogs form about the cape and bank against it very densely. Sometimes a vessel will carry clear weather from the Strait of Fuca to this cape and then encounter fogs that reach to San Francisco.

In summer weather, when the forest fires of the north are in full blast, the smoke is very thick along the whole coast, and this cape may be so completely hidden that it is dangerous to approach it to take a departure.

In summer, steam coasting vessels from the southward keep close under the coast-line to avoid the heavy swell and fierce winds which they will generally encounter here.

Cabrillo did not see Cape Mendocino, although usually credited with its discovery. He encountered heavy weather in this latitude, and was driven off shore. "They were at a point which makes a cape, which they called *Cabo de Fortunas* [Cape of Perils], on account of the many dangers they had experienced in those days, and it is in forty and one degrees." As all his latitudes are erroneous by one degree to one degree and a half, we may safely assume that he did not see the coast north of Point Delgada at Shelter Cove, in latitude forty degrees.

In Ferrelo's voyage next year he experienced a great storm which drove his vessels off shore, and when they were forced to return southward they did not see the land until they approached Point Arena, when they recognized the Cabo de Pinos [at Fort Ross]. He had been far north of Cape Mendocino; and between latitudes 39½° and 41½° he saw discolored water and other signs of a great river emptying on that part of the coast.

Vizcaino first located Cape Mendocino. In January, 1603—

> The flagship came in sight of some very high mountains of a reddish color; and fourteen leagues further to the northwest a chopped-off cape came directly upon the sea, and near it some snow-covered mountains; and the pilots judged this should be the Cape Mendocino which is in forty and one degrees.

On his chart he has a prominent headland in 40½° and a marked head at 41°. Between these he has a deep receding shore-line with a large river emptying into the northeast part thereof. This recession is Humboldt Bay; the big river was judged to be such by the deep valley in the direction of Mad River. The real Cape Mendocino was at 40½°, but no name appears there. The name "Cabo Mendocino" is placed abreast a cape of white cliffs in 41° 40′, whence the shore trends a short distance to the northeast. This may be Point St. George.

Vizcaino is supposed to have anchored under the Sugar Loaf Islet off Cape Mendocino, or off the large rock off False Cape; but he could not possibly have done so. (See remarks on Redding Rock.)

The Spanish galleons from the Philippine Islands to Acapulco appear to have generally made the American coast about Cape Mendocino as a landfall and well to windward and then to have run down the coast. As all the coast-line is very bold, every prominent mountain was naturally mistaken for the head, and many erroneous latitudes were thereby assigned to the cape.

In 1697 Gemelli reported the cape to be in 41° 20′; but he gathered his knowledge from the ship in which he traveled; he did not see the coast in this latitude.

In 1734 Don Joseph Gonzales Cabrera Bueno says Cape Mendocino is in 41½° where the coast makes a point of high land, bare of timber, with certain white cliffs overlooking the sea. He obtained his information from the captains and pilots of the galleons; he was never on this coast.

In latitude 40° 32′ La Pérouse (1786) lays down the cape as Punta Gorda, and depicts a burning volcano thereon. In his description he says he "perceived a volcano on the summit of a mountain which bore east from us. The flame was very vivid; but a thick fog soon concealed it from our sight." He did not see the land to the southward on account of the fog, but places Cape Mendocino in 40° 07′, which is the latitude assigned by Don Bruno de Heceta's mate for the cape (1775), "which is a projection into the sea with four ravines of a reddish color with some small trees in the declivities."

The Coast Survey has published a chart of the approaches to the cape, giving the soundings for five miles broad off the cape and hence northward of Cape Fortunas. This chart indicates all the known dangers. In 1870 the Coast and Geodetic Survey issued a notice to mariners warning them of the discovery of eight hidden dangers; and subsequently more were discovered. The coast chart exhibits the lines of off-shore soundings.

Views of the cape are given from various directions.

CAPE FORTUNAS OR FALSE CAPE.

This bold and precipitous head lies four and a quarter miles north half west (N. ¼ W.) from Cape Mendocino Light-house. It is the abrupt termination of a mountainous ridge projecting squarely upon the ocean.

Between the two capes the shore-line is very nearly straight to within half a mile of the False head, which projects only one quarter of a mile. The shore is bold, compact, and marked by two or three heavy slides several hundred feet above the sea. It is bordered by a broad, low-water beach and broken at the middle by the entrance of a small stream, called Bear Creek,* coming from the eastward through a valley about one quarter of a mile broad. The creek has a width of one hundred yards at the mouth between narrow, sandy points. It generally closes about July and opens about November. There are five fathoms of water abreast of the mouth within half a mile of the beach, upon which a heavy swell is generally breaking. Along this beach there is only one rock found, at one mile from the Light-house and close off a slight depression in the hills from which a rivulet issues. This *Lone Rock*, as it is called, is only one hundred and twenty five yards from the shore.

Cape Fortunas, at the upper edge of the steep pitch, is six hundred and fourteen feet above the sea; and thence the ridge stretches east by south (E. by S.) for two miles, where it attains an elevation of fifteen hundred and sixty feet. It is treeless, but covered with grass. The deep gulches under its south and north sides are filled with oak and redwood. The line of the escarpment of the cape continues broken for more than a mile to the north from its highest point, but decreases sharply in elevation towards the mouth of the first gulch.

The base of the cape has a low-water beach of rock, shingle, and sand, except at its very extremity. It is guarded by several outlying rocks and is marked by a high, rocky islet, two hundred and ten yards long northeast and southwest, rising two hundred and sixteen feet above the sea and lying five eighths of a mile from the pitch of the cape. Between it and the cape are *sunken rocks* and two smaller rocky islets rising ninety and forty-six feet above the sea. The largest islet is not so regularly shaped as the Sugar Loaf of Cape Mendocino, and from the southwest it presents the appearance of a truncated cone with the top nearly flat, but showing two indistinctly marked whitish patches on its flat top, with a dark break between them. From a long distance in the same direction it shows as a cone. From the northwest it appears much broader because it is seen broadside on.

Dangers—Rock awash.—One fifth of a mile west of the south end of the False Cape Rock is a rock awash.

Three Breaks.—One-third of a mile north sixty degrees west (N. 60° W.) from the south point of the False Cape Rock is the outer one of three breaks, with ten fathoms of water close up to it.

Twelve feet Break.—Three fifths of a mile south eighty-three degrees west (S. 83° W.) from the south point of the False Cape Rock lies a sunken rock with twelve feet of water upon it. There is thirteen fathoms of water close outside and deep water inside of it. To clear this rock keep Sharp Rock, off Cape Mendocino, well on the western edge of the Sugar Loaf.

Fifteen feet Rock.—There is a break on a fifteen-feet sunken rock one and one-eighth miles south half east (S. ½ E.) from False Cape Rock, with foul ground nearly half a mile westwardly. It is three-quarters of a mile broad off shore but is far inside of any vessel's track. To clear this foul ground keep Sharp Rock, off Cape Mendocino, on the western edge of the Sugar Loaf.

Northward of the False Cape Rock are several *sunken rocks* close under the shore, and also a cluster of three just inside the ten-fathom line and located by *Mussel Rock*, which lies exactly north (N.) of the middle of the False Cape Rock, distant three quarters of a mile. This rock is quite low, very small in extent, and lies very nearly half a mile broad off shore abreast the first large gulch on the north side of the cape. The three sunken rocks lie one hundred and forty yards to the northwest of Mussel Rock.

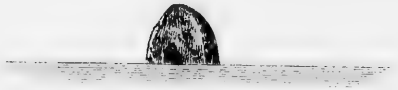
Inside of Mussel Rock are three small visible rocks and several sunken rocks. Thence to Bear Creek northward the shore-line is free from dangers.

The *soundings* off the cape show generally fifteen fathoms three-quarters of a mile outside the False Cape Rock, with rocky patches of seven and eight fathoms, and fine gray sand up to fifteen fathoms; twenty fathoms at one and one-eighth miles from the rock, with fine gray sand and

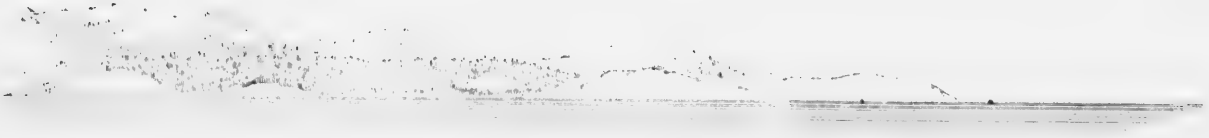
* It was locally known as McDonald's Creek (1870).

Sugar Loaf, 331 feet.
Sharp Rock.
Cape Mendocino Light-house, SE. ¾ E., 5 miles. Afternoon fog.

Rock off Cape Fortunas or False Cape, NE., 216 feet high.



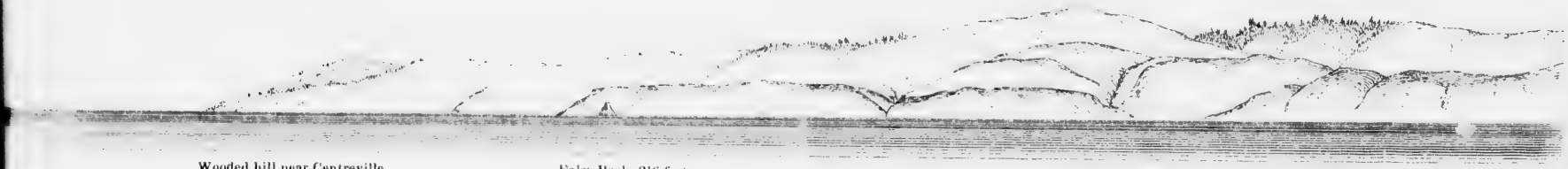
The Sugar Loaf, NE., off Cape Mendocino, 331 feet.



Cape Fortunas, 17½ miles. Cape Mendocino, S. 19° E., distant 21½ miles.

Sugar Loaf. Rock off Cape Fortunas.
Cape Mendocino Light-house.

Sugar Loaf, 331 feet.
Cape Mendocino, 1,365 feet, E.NE., 8 miles.
Noticeable tree.
Light-house, height 426 feet.
The Twins, 2,680 and 2,460 feet.
(1870)



Wooded hill near Centreville.
False Rock, 216 feet.
Cape Fortunas or False Cape, 700 feet high, NE., 10 miles.
Break. Blunt's Reef.

White line of sand beach.

Table Bluff, height 165 feet, S. 39° E.,

Humboldt Light-house, E. by N. ¾ N., 4 miles.

Red Bluff, 94 feet, E. ¼ S., 4½ miles.

Redding Rock, 83 feet, E.S.E. 4 miles.

Redding R

e Bluff, height 165 feet, S. 39° E., 5 miles.

Rock off Fortunas.
Sugar Loaf Rock off Mendocino.
Cape Fortunas, Cape Mendocino,
S. by E., 2¢ miles

feet, E. ¼ S., 4¼ miles.

Redding Rock, NE. by E. ¾ E., nearly 5 miles.

Redding Rock, N. by E., 8 miles.

White line of sand

Rock off Fortunas.

Sugar Loaf Rock off Mendocino.

Cape Fortunas Cape Mendocino,
S. by E., 20 miles

Humboldt Light-house, E. by N. ½ N., 4 mil

Redding Rock, 23 feet, E.SE.,

Redding Rock, N. by E., 8 miles.

mud. Thence the depth is quite uniform for nearly two miles farther out, reaching twenty-five fathoms at two and three-quarters miles from the rock, over a bottom of fine gray sand and brown mud; beyond this the hydrographic survey has not yet been extended (1886).

The geographical position of the Coast Survey station, which is on the pitch of the cape, six hundred and fourteen feet above the sea and five hundred and forty-five yards south seventy-four and a half degrees east (S. 74½° E.), true, from the extreme point of the cape, is as follows:

Latitude	40° 30′ 30″.1 north.
Longitude	124° 22′ 47″.1 west.
Or, in time	8ʰ 17ᵐ 31ˢ.1.

The magnetic variation in January, 1885, was 18° 12′ east, and increasing 0′. 9 annually.

From the False Cape Rock the Whistling Buoy off Humboldt Bar bears north two and a half degrees east (N. 2½° E.), distant seventeen miles; the Humboldt Light-house bears north nine degrees east (N. 9° E.), distant seventeen and a half miles; and Trinidad Light house bears north one degree east (N. 1° E.), distant thirty-four miles.

This cape was locally known as False Mendocino, then as False Cape; but in 1868 the Coast Survey named it Cape Fortunas to avoid the repetition of the name Mendocino, and to commemorate Ferrelo's discoveries, although he applied that name to the vicinity of Point Delgada. (See remarks on Cape Mendocino.)

La Pérouse calls this cape (combined with Cape Mendocino) Punta Gorda, and places it in latitude 40° 32′, but a thick fog prevented his seeing the immediate coast-line.

THE COAST FROM CAPE FORTUNAS TO TRINIDAD HEAD.

Northward of Cape Fortunas the shore-line is very straight, north six degrees east (N. 6° E.), for twenty-eight miles to the mouth of Mad River; and from Mad River to Trinidad Bay the shore-line is again straight north fourteen degrees west (N. 14° W.) for six miles. In this stretch of thirty-four miles the hills retreat for several miles inland, and the shore-line is broken by the mouths of Eel River, Humboldt Bay, and Mad River. From seaward it looks as if a great gulf made in well to the eastward. The shore is notably a long line of sand beach and sand dunes broken only by Table Bluff and Red Bluff. For four miles north of the cape the shore is bordered by high hills ranged in a series of ridges perpendicular to the coast-line, and decreasing in height as we approach Eel River Beach. The summits, rising to nine hundred and forty feet at one and a half miles abreast Centreville, are covered with redwood, and the gorges filled with oak and redwood. The shore has a low water beach which has quicksands in some places, making travel hazardous.

At four miles from the cape is the small settlement of *Centreville* close under the northwest slope of the hills, which here retreat well to the eastward to form the valley of Eel River. Centreville is located at the head of a small stream running northward, parallel with the ocean shore and not over a quarter of a mile therefrom. On this peninsula the sand dunes reach only twenty feet elevation.

EEL RIVER.

Eel River is a moderately good sized stream opening through the beach eight and three-quarters miles north of Cape Fortunas and thirteen miles from Cape Mendocino. From Blunt's Reef it bears north sixteen degrees east (N. 16° E.) thirteen and a half miles distant. It has a bar at its mouth with only six and a half feet of water upon it. The entrance is very narrow, and at the time of the surveys in 1869 and in 1875 the distance apart of the north and south points was only one hundred and seventy-five yards, and at low water considerably less. A small coasting steamer, drawing seven to eight feet of water, trades here, but can enter only at or near high tide, and even then there is almost continually a breaker on the bar. Just inside the two points the river receives *East Slough*, a short stream or slough from the south, and *McNulty's Slough* from the north. In the river, at the time of the surveys and examinations in 1869, 1870, and 1875, did not break straight through the shore-line at the junction of the sloughs but, one third of a mile northward, so that there is a tendency of the south point to push to the northward and also to overlap the north point on the outside. In 1870 the entrance between the points had moved to the northward two hundred and thirty-three yards in one year, but preserving about the same

width. When it works far to the north there is a tendency to break through the south spit or cut it away.

The depth of water upon the bar is greatly dependent upon the character of the winter. If the rains are heavy the channel washes out; if two or three winters succeed each other with light rains the bar spreads out and shoals. Sometimes there are two channels over the bar, in which case the best depth of water may be only eight feet at high water, although the average is said to be ten feet. At other times there is but one channel, as after the freshet of February, 1877, when the channel was broader and the depth of water fourteen feet.

In 1877 the coasting steamer *Continental* had made over sixty passages across the bar; this vessel drew about seven feet of water, and eight feet when deep, and entered and departed both at the ebb and flood tides, but much preferred the flood. She generally entered between half flood and high tide.

Inside and opposite the entrance there is a low island covered with pine and deciduous trees; and upon this island, abreast the north point, there has been erected a leading-in mark with its seaward face boarded up and a large cross surmounting the structure. The passage across the bar is made by bringing this mark in range with a given part of the north spit; of course it is subject to change.

The steamers have a landing at Port Kenyon, three and a half miles up Salt Slough, and another at Eastlake, one mile inside the entrance where Eastlake Slough enters the Eel River. The McNulty Slough is navigable at high water for vessels of light draught to Table Bluff.

Abreast Eel River the six-fathom line is half a mile off the beach; the ten-fathom line is one mile off, but to the southward it is less than a mile, and to the northward one and one-quarter miles. The fifteen-fathom line is two and a half miles from shore; and the twenty-fathom line is four miles off. Abreast of Centerville the twenty-fathom line is only three miles off shore, and the same at four miles to the northward abreast of Table Bluff.

Eel River is one of the longest rivers in California. It rises by two heads in latitude 39° 30′, about thirty miles from the coast inside Cape Vizcaino, and runs somewhat parallel with the coast-line, one branch coming from the south base of Snow Mountain, whilst the head of the south fork is only five miles from the coast twenty-five miles south of Shelter Cove. It is the first important salmon stream north of the Sacramento River.

The first vessel that entered it was a schooner in the spring of 1850, when searching for Humboldt Bay. She thumped over the bar, which was said to have had nine feet of water upon it at high tide.

The Indian name of this river is Wee-ot-lol-la. From the great number of eels caught in it by the Indians it received its present name from the party that discovered Humboldt Bay by land in December, 1849.

Eel River—Buoy.—To mark the entrance to Eel River, a *second-class nun-buoy*, painted with *black and white perpendicular stripes*, has been placed in eight fathoms of water over sandy bottom about three-quarters of a mile west of the present end of the north spit. This buoy will be changed by the United States Light-house Inspector from time to time as the bar at the entrance shifts its position, but the buoy will always be placed in the same depth of water.

Table Bluff.—This is a well-marked feature of the coast-line on the low sandy shores between Cape Fortunas and Trinidad Bay. It is a good mark for making Humboldt Bay, lying five miles south by east one-third east (S. by E. ⅓ E.) from the Whistling Buoy off the bar. Its northern extremity lies twelve and a half miles north of Cape Fortunas, and sixteen and three-quarters miles from Blunt's Reef. From a distance seaward it appears to stand out from the general trend of the shore, but its seaward face, half a mile broad, is directly on the beach. It is one hundred and sixty-five feet high at its western extremity, and inland it decreases sixty feet in a mile, whence it again rises to four hundred feet at two and a half miles. The highest and steepest face is towards the north, and it slopes gradually towards the south; the seaward face is very steep and water-worn. The surface is wooded, the trees commencing some distance eastward of the seaward face; on the ridge one or two miles back from the shore are several houses. At the base of Table Bluff a horse tramway was built around the ocean face to connect the traffic of Eel River with that of Humboldt Bay, but this has been abandoned.

Abreast the north part of Table Bluff the six-fathom line is less than half a mile off shore; the ten fathom is one mile; the fifteen-fathom two miles; the twenty-fathom three miles; and the twenty five-fathom line lies four miles from shore; the bottom is uniformly fine gray sand.

The geographical position of the northwest point of Table Bluff, as determined by the Coast and Geodetic Survey, is

Latitude	40° 41′ 48″.3 north.
Longitude	124 16′ 09″.1 west.
Or, in time	8h 17m 04s.6.

The magnetic variation was 18° 15′ east in January, 1885, with an annual increase of 1′.0.

It has been proposed to remove the Humboldt Light-house to this bluff.

HUMBOLDT BAY.

The entrance to this bay lies sixteen and a half miles north seven degrees east (N. 7° E.) from Cape Fortunas; and the Whistling Buoy off the bar lies twenty-one miles north one degree west (N. 1° W.) from Cape Mendocino Light-house, and twenty-two miles north eleven degrees east (N. 11° E.) from the Whistling Buoy off Blunt's Reef.

The bay itself is situated parallel with the coast-line immediately behind the low sand spits and dunes between Table Bluff and Mad River. It extends four miles south and nine miles north of the entrance, and is sharply contracted to one-third of a mile in width between Red Bluff and the south point of the entrance. For further description of the shores of the bay see page 327.

Red Bluff is the one marked feature of the entrance to this bay. It is a small hillock with two faces visible from seaward. The northwest face is one-third of a mile long, and the southeast face the same. It is nearly flat-topped, with the highest part ninety-six feet above the sea at the seaward extremity, with a gentle slope thence towards the northeast. The northwest face is steep and water-worn, presenting a reddish appearance from the oxidation of iron ore in the gravel; the southeast face is also steep but covered with grass, and has trees under it. Behind it the land falls nearly to the level of the bay, and a stream nearly cuts it off from the main-land. *Humboldt Point*, one-third of a mile long, stretches southeastwardly on the line of the northwest face of the bluff. It is low, reaches the deep water leading to the south arm of the bay, and has a few houses upon it. These houses are seen over the outer spits at the entrance.

On this bluff the pilots have a flag-staff to range with known points of trees on the I-u-quá Buttes, by which ranges they cross the bar and keep the run of its changes.

The low land on the eastern shore of the bay northward of Red Bluff averages half a mile in width and extends as far as Eureka, gradually changing to marsh and bordered by hills densely covered with redwood forest.

The comparative isolation of Red Bluff gives it the appearance of an island when the haze settles thickly behind it.

The Entrance to Humboldt Bay is generally about half a mile wide between the two low, sandy points, and is marked by Red Bluff inside and just abreast of it, and by the Light-house on the north point. To the southward Table Bluff, described on page 322, is the landmark for making it. The distance between the northern and southern points varies from three-eighths to five-eighths of a mile, and averages half a mile. These long sandy points at the entrance to the bay, and which form its western boundary, are known as the South Spit or Peninsula and the North Spit or Peninsula.

The *South Spit*, separating the southern part of Humboldt Bay from the ocean, is formed of low sand dunes and grassy hillocks, and has no trees upon it. It is bordered on the bay side by narrow patches of marsh. It is three and three-quarters miles long from Table Bluff, and in places only eighty yards across; the widest part is three hundred and fifty yards between high-water marks.

The *North Spit* or Peninsula averages half a mile in breadth and is ten and a half miles long, reaching from within three-quarters of a mile of the mouth of Mad River. Its southern extremity, near the Light-house, is composed of low dunes, and north of that higher dunes, changing into sandy and grassy hillocks disposed in a marked manner parallel with the direction of the northwest winds. Two miles north of the Light-house there is a stretch of one mile of the peninsula sparsely covered with trees, then an open space of one mile, after which the line of forest trees is unbroken. The highest dunes are about eighty-five feet above the sea, and the wood and undergrowth are especially dense on the bay side. On this peninsula are several stock ranches; there is also a saw-mill on the bay side nearly opposite Bucksport, and an extensive ship-yard a little to the north of it.

THE HUMBOLDT BAR.

Like the entrances to all the rivers and bays on this coast, this has a bar, which undergoes irregular changes, depending much upon the prevalence, direction, and strength of the wind and swell, upon the direction of the ebb current through the entrance, and doubtless upon the volume of fresh water brought down by the streams entering the bay. The depth of water on the bar ranges from twelve to twenty-four feet at low water. The width, direction, and position of the bar vary irregularly. The north and south spits also cut away and re-form. The history of the principal changes was noted in the last edition and need not be repeated or enlarged upon.

From experiments made in 1854 we found the ebb-current in the channel to run three miles per hour, with a maximum velocity of four and five miles between the north and south points of the entrance.

DIRECTIONS FOR HUMBOLDT BAR.

Under the above varying conditions of the bar and channel no sailing directions can be given, because changes may occur immediately after an examination. As the bar has always had the services of superior pilotage and towage, the best advice we can offer in regard to entering the bay is to *wait for the pilot tug.* When vessels are seen approaching the bar, a flag is hoisted on the flag-staff on Red Bluff and the tug goes out to tow them in; if the bar is heavy and the tug can not cross it, yet considers it safe for the vessel to cross, she lies close inside the bar and sets a signal at the mast-head for the vessel to run for. A stranger should not under any circumstances attempt to cross the bar without a pilot. There are several powerful tugs with skilful pilots.

Vessels approaching at night can run along in twenty to fifteen fathoms of water, and nothing less, until the light bears east and wait for daylight. In thick weather run along in the same depth of water until the Whistling Buoy off the bar, or the steam fog-whistle at the Light-house is heard and bearing east; then anchor until the tug comes out.

Hydrography.—The soundings off the bar are very uniform over a sandy bottom. The depth increases gradually to sixteen fathoms at two miles, and to twenty-five fathoms at four miles. A depth of forty fathoms is found at six to seven miles off shore. Westward and broad off the entrance the depth appears to increase rapidly after passing the one-hundred-fathom line at about seventeen miles, and reaches two hundred and twenty fathoms at twenty-three miles, over a bottom of green mud.

Currents.—In the spring of 1854, when lying off the bar for two weeks in heavy southeast weather, we found that the drift of the current, at four or five miles off shore, was to the northward.

In the summer of 1867, when a few miles off the bar, we found the ebb-current running west northwest from the bar, setting the vessel well off shore.

In the summer of 1870, in prolonged calm weather, we found the in-shore eddy-current making to the northward past Cape Mendocino about one and a quarter miles per hour for fifteen miles off shore; outside of that limit the current was running to the southward.

Nine miles south forty-two and a half degrees west (S. 42½° W.) from the light-house, and five and a half miles broad off shore, a current station was incidentally occupied for two days in July, 1872, in calm weather. The depth of water was eighteen fathoms over fine gray sand and mud. The general set of the current was to the south and southwest from three-tenths to nine-tenths of a mile per hour, except during the strength of the largest ebb of the day when there was a feeble set to the northwest.

HUMBOLDT BAY LIGHT-HOUSE.

This is a secondary sea-coast Light, located on the North Spit or Peninsula, three-quarters of a mile north of the entrance to the bay and about midway between the bay and the sea-shores. It lies nearly one and a half miles north forty-four degrees west (N. 44° W.) from Red Bluff. It consists of a keeper's dwelling of one and a half stories, with a circular tower (the frustum of a cone) rising twenty-one feet above the center of the roof. Both are built of brick, plastered, painted white, and surmounted by an iron lantern, the dome and balustrade of which are painted red. The Light was first exhibited on December 20, 1856, and shows from sunset to sunrise a *fixed white light* of the fourth order of the system of Fresnel, and illuminates the entire horizon. The

height of the tower from base to focal plane is forty-five feet, and the focal plane is fifty-three feet above the mean level of the sea. The light should be seen in clear weather from a height of—

10 feet at a distance of 12 miles.
20 feet at a distance of 13½ miles.
30 feet at a distance of 14½ miles.

Its geographical position, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	40	46′	01″ north.
Longitude	124	13′	14″ west.
Or, in time	8h	16m	52s.9.

From the light the bearings and distances to prominent objects are as follows:

Cape Mendocino Light-house	S.	3½ W.	21½ miles.
Blunt's Reef, off Cape Mendocino	S.	13½ W.	22½ miles.
Cape Fortunas, False Cape Rock	S.	9 W.	17½ miles.
Trinidad Head Light-house	N.	7½ W.	17 miles.
Crescent City Light-house	N.	17½ W.	50 miles.
St. George's Reef (proposed light)*	N.	23 W.	64 miles.
Cape Orford Light-house	N.	25°	125 miles.

A light on Red Bluff, which is nearly one hundred feet high, would always serve as a leading range, as the flag-staff and ensign placed there are now thus used by the pilots. It would be distinguishable readily at sea, when the present one might be obscured by the mist hanging over the surf on the beach. During the day the white buildings would be a capital mark against the green hills and trees in the background. This view, now and formerly expressed, has been repeatedly and earnestly urged upon our attention by many captains, merchants, and the pilots of Humboldt Bay.

FOG-WHISTLE AT HUMBOLDT LIGHT-HOUSE.

This is a twelve-inch steam-whistle, which gives *alternate blasts of four seconds* and *eight seconds* with *intervals* of *twenty-four seconds*. The house containing the signal apparatus is situated between the Light-house and the bay-beach.

Life-saving Station.—A first-class Life-saving Station, with permanent crew, boats, and other life saving apparatus, is established at Humboldt Entrance, and located on the bay-beach of the north peninsula almost east or abreast of the Light-house and fog-signal buildings.

BUOYS FOR HUMBOLDT BAY AND APPROACHES.

A first-class *whistling buoy* has been placed about one mile outside the bar in sixteen fathoms of water over hard, sandy bottom. It is painted with *black and white perpendicular stripes*. The whistle is sounded by the action of the sea; the heavier the sea the louder the blasts, which sound about twenty or thirty times a minute.

There is good anchorage around the whistling buoy while a vessel is waiting for a pilot.

From this buoy the following bearings and distances are given to near and important objects:

Humboldt Light-house	N.	86 E.	1¾ miles.
Flag-staff on Red Bluff	S.	66 E.	2¾ miles.
Outer edge of Table Bluff	S.	14 E.	5 miles.
Whistling Buoy off Blunt's Reef, Cape Mendocino	S.	11 W.	22 miles.
Trinidad Head Light-house	N.	1½ W.	17 miles.
Crescent City Light-house	N.	16° W.	58 miles

The bearing of the bar is not given because it changes its position too frequently.

Mid-channel Bar Buoy—A *second-class can buoy*, painted with *black and white perpendicular stripes*, has been placed in nine fathoms of water over hard, sandy bottom *just outside the breakers on the bar*. It is one and three-eighths miles west by south five-eighths south (W. by S. ⅝ S.) from the Humboldt Light.

Howard Spit Buoy.—This is a *third-class nun-buoy* painted with *red and white horizontal stripes*. It is placed on the western extremity of the hard, sandy spit making out one-quarter of a mile

*The northwesternmost rock of the Crescent City Reef.

from the northwest face of Red Bluff, and locally known as Howard Spit. It lies in thirteen feet of water over hard, sandy bottom. From it are given the following bearings and distances:

Red Bluff, highest point	SE. ¼ S.	¼ mile.
Humboldt Light-house	WNW.	1¼ miles.
Buoy on lower end of middle ground in the south arm of the bay	S. by W. ½ W.	½ mile.

The Howard Spit Buoy must be left on the starboard hand when bound to Eureka or the north arm of the bay; and on the port hand when bound to the south arm of the bay.

BUOYS TO MARK THE PASSAGE TO THE NORTH ARM OF THE BAY, GENERALLY CALLED THE EUREKA CHANNEL.

Buoy No. 2.—This is a *third-class can-buoy, painted red* and *numbered* **2**, placed in twelve feet of water over hard, sandy bottom, and must be left on the starboard hand when entering. No bearings can be given because the channel changes. It is abreast the tail of the north spit or peninsula.

Buoy No. 1.—This is a *third-class nun-buoy, painted black* and *numbered* **1**, placed in fourteen feet of water over hard, sandy bottom, and must be left on the port hand in entering. It is on the north side of the channel about one mile south by east seven-eighths east (S. by E. ⅞ E.) from Humboldt Light.

Buoy No. 3.—This is a *third-class nun-buoy, painted black* and *numbered* **3**, placed in fifteen feet of water over hard, sandy bottom and must be left on the port hand in entering. It is three-quarters of a mile southeast seven-eighths south (SE. ⅞ S.) from the Light-house.

Buoy No. 4.—This is a *third-class can-buoy, painted red* and *numbered* **4**, placed in eighteen feet of water, and must be left on the starboard hand in entering. No bearings can be given because the channel changes.

Indian Island Spit Buoy.—One-quarter of a mile south of the southern extremity of Indian Island, where the shoal spit divides the main channel into two, one running towards Eureka and the other between the north peninsula and Indian Island towards Mad River and Arcata, there is placed a *third class nun buoy, painted with black and red horizontal stripes.* It lies in ten feet of water over hard, sandy bottom. Farther on the spit when the water shoals to eight feet the bottom is sticky. Vessels bound for Eureka leave this buoy on the port hand; and those bound for Arcata or the Mad River channel leave it on the starboard hand. From this buoy the following bearings are given to prominent objects:

Saw-mill Wharf	NE. by E. ½ E.	½ mile.
South point of Indian Island	N. by E. ½ E.	½ mile.
Flanigan's Wharf, east side of the channel	South.	⅝ mile.

South Bay Buoy.—About half a mile south of the passage to the southern arm of Humboldt Bay the channel divides into two branches. On the north point of the middle ground between them there is placed a *third class nun-buoy painted with red and black horizontal stripes.* It lies in ten feet of water over hard, sandy bottom. Vessels in passing up the eastern branch to Field's Landing and Hookton leave this buoy on the starboard hand, giving it a good berth; those passing up the western branch to Myers' Landing leave it on the port hand. From this buoy the following bearings and distances are given to prominent objects:

Red Bluff Flagstaff	NE. ¼ N.	½ mile.
Howard Spit Buoy	N. by E. ¼ E.	⅝ mile.
Humboldt Light-house	N. ¾ W.	1½ miles.

In the North Bay the channel to Arcata Wharf is marked near its upper reaches with piles on the port hand, and one barrel beacon on the starboard. In the South Bay the channel to Hookton Landing is marked by beacons on either side of the channel, commencing less than half a mile from Point Humboldt.

Hookton Channel.—A *single pile beacon*, painted *red* and *numbered* **2**, has been placed on the west side of the channel, about half-way from Point Humboldt to the wharf at Field's Landing, to mark a sharp turn in the channel. It is nine hundred yards north by west half west (N. by W. ½ W.) from the northern end of Field's Landing.

A *single pile beacon* painted *red*, and *numbered* **6**, has been placed on the end of a shoal two hundred and forty yards from the northern side of the entrance to Clark's Slough.

Eureka.—A single *pile beacon* painted with *red and black* bands has been placed between the city wharf and Indian Island to mark the end of the shoal ground at the junction of Eureka Slough and the channel from the upper bay, on the southeast side of Indian Island. It is half a mile (nine hundred and seventy-five yards) east by north five-eighths north (E. by N. $\frac{5}{8}$ N.) from the south end of Indian Island.

Arcata Channel.—The channel to Arcata, on the northwest side of Indian Island, has been marked by six beacons. Three of these beacons are painted *red*, and *numbered respectively* **8**, **10**, and **12**; three are painted *black*, and *numbered respectively* **5**, **7**, and **9**. In proceeding to Arcata keep the red beacons on the starboard hand and the black beacons on the port hand.

The following distances and bearings from the northern extremity of Indian Island locate these beacons:

Beacon **No. 8**, seven hundred and eighty yards west seven-eighths south (W. $\frac{7}{8}$ S.); **No. 10**, seventeen hundred yards, northeast one-quarter east (NE. $\frac{1}{4}$ E.); **No. 12**, a mile and a half (three thousand one hundred and fifty yards) northeast one-quarter north (NE. $\frac{1}{4}$ N.). Beacon **No. 5**, half a mile (one thousand one hundred yards) northeast seven-eighths north (NE. $\frac{7}{8}$ N.); **No. 7**, one and one-half miles (two thousand nine hundred yards) northeast five-eighths north (NE. $\frac{5}{8}$ N.); **No. 9**, two miles (four thousand and seventy-five yards) northeast three-eighths north (NE. $\frac{3}{8}$ N.).

Tides at Humboldt Bay.—The tides are of the usual Pacific Coast type, there being one large and one small tide during each day. The heights of two successive high waters (occurring one in the morning and one in the afternoon of the same twenty-four hours) and the intervals from the next preceding transit of the moon are very different. These irregularities depend upon the moon's declination. They disappear near the time that the moon's declination is nothing and are greatest about the time that the declination is the greatest. The inequalities for low water are not the same as for high, although they disappear and have the greatest value at nearly the same times.

When the moon's declination is north, the higher of the two high tides of the twenty-four hours occurs at Humboldt Entrance about $11^h\ 06^m$ after the moon's transit; and when the declination is south the higher of the two high tides occurs about $1^h\ 20^m$ before the moon's transit. The lower of the two low waters of the day is the one which follows the higher of the high waters.

The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is $11^h\ 39^m$; and the difference between the greatest and least of the intervals is $1^h\ 11^m$. The mean rise and fall of tides is four and four-tenths feet; of the spring tides five and one-half feet; and of the neap tides three and one-half feet. The mean duration of the flood is $6^h\ 14^m$, and of the ebb $6^h\ 11^m$, reckoning from the middle of one stand to the middle of the next.

The average difference between the Corrected Establishment of the a. m. and p. m. tides of the same day is $1^h\ 13^m$ for high water and $1^h\ 04^m$ for low water. These differences, when the moon's declination is greatest, are $2^h\ 09^m$ and $1^h\ 38^m$. The average difference in height of these tides is one and three-tenths feet for the high waters, and two and one-tenth feet for the low waters. When the moon's declination is greatest, these differences are two and one-tenth feet and three and four-tenths feet, respectively. The average difference between the higher high and lower low waters of the same day is six and one-tenth feet, and when the moon's declination is greatest, seven and one-tenth feet.

To find the times and heights of the tides at Humboldt Bay, take them from the daily tide-table for Astoria, and then for the high waters subtract one hour and six minutes for the time and subtract one and seventh-tenths feet for the height; for the low waters subtract one hour and nineteen minutes, and take the height unchanged.

The time of high water is eighteen minutes later at Eureka, and the height two-tenths of a foot higher; the time of low water is twenty minutes later, and the height one-tenth of a foot less.

INSIDE THE ENTRANCE TO HUMBOLDT BAY.

South of the entrance the bay expands to two miles in width and runs close up to the north face of Table Bluff. The single channel running into this southern part of the bay divides into two narrow and crooked ones which decrease in depth from three fathoms to one; all the rest shows a bare mud-flat at low tides. One channel runs into the Hookton Slough at the southeast angle of the bay, and steamers run one and a half miles up this slough to Hookton Landing, a quarter of a mile below the village of Hookton. The United States Engineers are dredging this

channel to give ten feet at low water. It is marked by piles on either side. The other channel runs directly towards the depression in Table Bluff through the middle of the flats to Myers Landing or Southport, where a wharf almost half a mile in length is built out to deep water. This landing is now abandoned and the wharf is breaking up. A new landing called *Field's Landing* is now established in the Hookton channel, one and a half miles south-southeast from the entrance to the bay and seven-eighths of a mile south-southeast from Point Humboldt. A wharf is built here at the terminus of a railroad coming from the Eel River Valley and piercing Table Bluff by a tunnel.

The face of this wharf, parallel to the channel, is nearly three hundred yards long and has nearly three fathoms of water alongside of it.

Abreast the entrance, between Red Bluff and Elk River, the bay is one mile wide, with broad flats under the eastern shore and extensive sands, bare at low water, lying midway between the opposite shores and running nearly parallel with them. Thence to the northward the average width of the bay is half a mile for a distance of three and a half miles. It then expands into a broad, shallow sheet of water, known as the North Bay, with several marshy islands bordering the southeast part. This broad bay is bordered by extensive marshy grounds with sloughs through them. The greater part of it is bare at low water, showing mud flats, through which two or three crooked channels lead to the sloughs. In the channel-way close under the north peninsula not less than three fathoms may be carried, increasing for three miles to six and a half fathoms; and this channel is prolonged to a slough leading through the marshy land at the northwest angle of the bay nearly to the mouth of Mad River, and known as Mad River Slough. A narrow canal has been cut to connect Mad River with the head of this slough, through which saw-logs were formerly brought from the logging camps in Mad River Valley to the saw-mills in Humboldt Bay. It is not improbable that at one time Mad River was the great feeder to Humboldt Bay and emptied into its northwest angle. At present only three short, small streams enter it from the east—Jacobs' and Freshwater Creeks in the north bay and Mowitch or Elk River one mile north of the entrance.

On Humboldt Point, under the south side of Red Bluff, is the village of Humboldt. Two miles north of the entrance and on the eastern side of the bay is situated the town of Bucksport, off which there was at one time a depth of three and a half fathoms of water within one hundred and fifty yards of the shore. In 1871 we found the saw-mill located there abandoned and the place deserted. The banks had been badly cut away.

In 1886 there was a broad wharf here, but the channel to the southward was closed, and only ten feet of water could be had at the wharf when it was approached from the northward.

The military station of Fort Humboldt was on a reservation on the bluff about one hundred feet high and immediately behind Bucksport. It is abandoned. Some of the buildings still remain.

On the same side of the bay and four miles north of the entrance is the thriving city of Eureka, with several low, marshy islands directly abreast of it. The passage between the water-front of Eureka and the nearest island to the northward is only two hundred yards wide, and at the settlement of the place it had nearly three fathoms of water in it, but the mouth of this passage leading to the main channel had only seven or eight feet. The town was laid out before this latter fact was discovered. The channel is now being dredged by the United States Engineers. Vessels lie at the wharves to load lumber and produce, and rest on the mud at low tide.

Eureka is the great lumber center of this region, and its shipping is enormous. No less than eight railroads, some of considerable length, are built from various points on the shores of Humboldt Bay to tap the vast forest regions surrounding it, including also the Eel River and Mad River Valleys. Many of the saw-mills for manufacturing the lumber are located at or in the immediate vicinity of Eureka. It is a port of entry in the collection district of San Francisco, and a great number of vessels trade directly with foreign ports. It has regular and frequent communication by steamers with San Francisco and other points and is connected with them by telegraph. In 1880 the population of Eureka was 2,639.

The low islands opposite Eureka are cut up by sloughs and ponds. The largest, called Indian Island, is about a mile long northeast and southwest and half a mile in width. It is marked by two hillocks surmounted by clumps of trees, near which were (1854) several wretched Indian huts. There are extensive saw-mill buildings and wharves on the southeast side of this island, and the channel here is much deeper than abreast the water-front of Eureka. The smaller island lies between this Indian Island and Eureka and generally parallel with the shores of both.

For the benefit of sailing masters desirous of checking their chronometers while lying at Eureka, we give the geographical position of the astronomical station in the public square of Eureka, as determined by the U. S. Coast and Geodetic Survey, as follows:

Latitude	40° 48′ 07″.3 north.
Longitude	124° 09′ 35″.7 west.
Or, in time	8h 16m 38s.4.

The magnetic variation was 18° 20′ east in January, 1885, and increases annually 1′.

Arcata, formerly Uniontown, is situated in the middle of the north shore of the bay. It was formerly reached by boats only at high water, but a long wharf has been constructed well over the flats, and the United States Engineers have dredged a channel of ten feet at low water to the wharf. A railroad from the Mad River valley carries lumber to vessels loading at this wharf. This place was a starting point for the Trinity and Klamath gold mines, and is now the shipping point for an extensive and rich lumbering, agricultural, and stock region drained by the Mad River and smaller streams. It has regular communication by steamer with San Francisco. In 1880 its population was 702.

The Weather in the vicinity of Humboldt Bay.—The fogs of summer are very persistent over the approaches to Humboldt Bay, sometimes continuing for weeks at a time with an occasional lighting up in the middle of the day. The summer winds blow strongly, as this break in the coast barrier and the Eel River valley form the first windgap north of the mountainous backbone of Cape Mendocino. The rain-fall is much heavier than to the southward; for eleven years, 1863 to 1873, it was measured at Eureka with the following result:

Year.	Rain-fall (inches).	Month.	Rain-fall (inches).
1863	36.75	July	0.05
1864	36.39	August	0.00
1865	27.99	September	0.34
1866	47.49	October	1.20
1867	36.28	November	4.44
1868	33.01	December	6.21
1869	25.52	January	5.42
1870	28.35	February	5.33
1871	34.67	March	5.23
1872	35.91	April	2.84
1873	25.45	May	0.88
		June	0.59
Average	32.53	Yearly average	32.53

The following account from Tebenkoff's description of the charts in his atlas published in 1848, with accompanying chart containing soundings and details of Indian Island, is the first notice of the existence of Humboldt Bay:

About eight and a half miles from the port of Trinidad is situated the entrance to the Bay of Indians, called entrance of Rezanoff. By the colonial documents of the Russian-American Company, it appears that it was discovered by citizens of the United States. In 1806 there was in it (on an American vessel), under command of Wirschep, a sea-otter party of Aleutians, under the direction of Slabotchikoff, which was met by the Indians inimically. This bay is not fully described, but it is known that it is very large; somewhat resembles the Bay of San Francisco, only the entrance to it for vessels of large class is not convenient, and with strong southwest winds it is even impossible with any vessel. The depth at the entrance is two sajhen (twelve feet), and then it breaks on the bar.

He placed the south point of the entrance in latitude 40° 55′.4, longitude 124° 08′.

It was named Rezanoff after the Russian ambassador to Japan in 1804, who had influenced the Emperor Paul not to break up the Russian-American Company.

The bay was rediscovered by a party of Americans from the Trinity River in December, 1849, and named Trinity Bay; it was again discovered by sea in April, 1850, and then received its present name.

The Indian name of the bay is Qual-a-waloo.

Mad River.—Northward of the entrance to Humboldt Bay the coast-line of the northern peninsula is very straight to the mouth of Mad River, which lies ten and a half miles north three and one-third degrees east (N. 3¼° E.) from the Humboldt Light-house, and seven miles south twenty-five degrees east (S. 25° E.) from Trinidad Light-house. The sand dunes of the peninsula are

drifted in the line of the northwest winds, and reach seventy feet in elevation, whilst behind them the oaks and spruce spread to the bay shore, but show their tops above the dunes.

The mouth of Mad River is about one hundred and ten yards in width, and opens to the northwest though a narrow channel at low water. Near the mouth it is fordable at low water, and it is reported to be closed in excessively dry seasons. The beaches are low and sandy, the dunes rising from twenty to sixty feet, and the forest comes within two or three hundred yards of the beach. The lowness of the sand dunes, and a few houses on the north and south sides of the river, indicate its locality. Behind the sand dunes to the southward the land is low and marshy, and intersected by sloughs and streams; to the northward the wooded land touches the sand hills and is somewhat higher. There are two lagoons on the north side of the river; they lie parallel with the shore and about two hundred yards inside of it. The nearer one is three hundred yards from the river, and the farther one mile.

For five-sixths of a mile inside the mouth, the course of the river is from the southeast, but then a sharp bend takes place. Here a canal, eight hundred and fifty yards long, connects the river with the head of the slough coming from Humboldt Bay, affording water communication therewith, and, before the building of the railroads, it was utilized in floating saw logs from the Mad River valley into the bay. All the indications point to the river having formerly emptied into Humboldt Bay at this point.

Mad River rises about eighty miles to the southeast on the northern flanks of Mount Linn, which overlooks the Sacramento valley. The town of Mad River is situated about seven or eight miles up the river.

This river was not named by Bodega. (See Little River.)

Hydrography.—Off Mad River the ten-fathom line of soundings runs parallel with the beach and a scant half mile distant; the bottom is fine gray sand. The twenty-fathom line is two miles from shore to the southward, but when nearly abreast of the mouth of the river it spreads out to almost three miles, with bottom of fine gray sand. The thirty-fathom line is four miles from shore, and the bottom changes to sticky, green mud. The forty fathom line is six miles off shore, over soft brown mud. The fifty-fathom line is seven and a half miles; the one-hundred-fathom line is eleven miles; and the two-hundred-fathom line thirteen and a half miles off shore, all over hard, brown mud.

Little Trinidad River.—The low sandy coast-line continues five and a half miles farther northward from the mouth of Mad River, changing its direction to north by west, to the mouth of Little Trinidad River. The low-water beach between the two is from one hundred and twenty-five to three hundred yards wide. The sand dunes are from twenty to sixty feet high, and stretch inland two hundred to three hundred yards to the base of a steep rise, two hundred and fifty feet high, and flanked by deciduous trees and pine. Along the lines of the small water-courses are dense forests; on the higher lands are prairies.

The mouth of Little River is only eighty-five yards in width, but the valley through which it comes is quite broad, and from seaward it gives the impression of a large stream. At low water there is only a narrow, fordable channel to the sea. From Trinidad Light the mouth bears south seventy-one and a half degrees east (S. 71½° E.) distant two and one-third miles. The south point is formed by a low, narrow, sandy peninsula, seven hundred yards long; at the north point begin the rocky, wooded cliffs running hence to Trinidad Bay and further northward. At six hundred yards northwest from the mouth of the river the low-water beach ends. The forests covering the cliffs are pine and redwood.

This small stream is the Rio de los Tortolas of Heceta and Bodega, who discovered it in June, 1775, from the summit of Trinidad Head. They say that at the distance of three-fourths of a league to the southeast they saw a large river that emptied into the sea from between two mountains. It was ten varas wide and two varas deep, but had a shallow bar. They followed it up about a league, saw turtle-doves, etc., whence its name. They had passed Mad River without noting it.

As there is already one stream named Little River, we have added the name Trinidad to designate this stream.

Little River Rock.—This is a high islet lying three hundred and fifty yards off the rocky shore three-quarters of a mile west-northwest from the mouth of Little Trinidad River, and directly on the line therefrom to Trinidad Light-house. It is about one hundred and forty yards long, northeast and southwest, by ninety yards broad, and its highest point is one hundred and

y feet above the sea; its shores are rugged and bold. There is shallow water and very foul ... and inside it, with ten or fifteen rocks above water between it and the shore. Two thirds of the rock to the southwest projects into good water, there being four fathoms of water on its off-shore side. One hundred yards to the northwest of this rock lies a smaller rock, of ten feet elevation and sixty yards extent, outside the three-fathom line of soundings.

TRINIDAD HEAD AND BAY.

Trinidad Head lies thirty-eight miles north one degree west (N. 1° W.) from Cape Mendocino, and seventeen miles north one and a half degrees west (N. 1½° W.) from the Whistling Buoy off the Humboldt Bar. The low sandy beach from Centreville continues to Little Trinidad River within two and one-third miles of the Head. There the coast line changes its character, and we have again the bold, black, rocky cliffs, timbered to their edge, and guarded by many rocks and rocky islets, even within the bay itself. From a reasonable distance Trinidad Head is a notable feature on this part of the coast; it is about seven hundred yards in extent, northwest and southeast, by about five hundred yards northeast and southwest, and three hundred and eighty feet high: from a vessel close inshore, either north or south of it, it shows as a dark, round-topped island covered with chaparral. It has very steep, rocky sides, and the depth of water close under its southern base is eight fathoms.

Off the northwestern face lie two large, rocky islets, named Off Trinidad Rock and Blank Rock, elsewhere described. The north part of the Head is connected with the mainland by a low, narrow peninsula, and projecting from the southeast side of this neck is *Little Head*, which is a knoll one hundred and twenty-five feet high, covered with trees, and stretching one hundred and fifty yards into the bay.

The *bay* or *roadstead of Trinidad*, lying to the east and southeast of the Head, is quite contracted, but has deep water and regular bottom, with no hidden dangers in the approaches from the southeast through the south to the west by south; it forms a good and safe summer anchorage. If the extent of the bay be considered to be north of a line running east by north from the south point of the Head, the distance from the Head to the four-fathom line off the eastern shore will be three-quarters of a mile; and from that easterly line to the three-fathom line at the deepest part of the bight northward, a little over one-quarter of a mile, but the shore-line is nearly half a mile northward.

The east side of the Head is rounding, but its general direction is west of north. It has deep water close up to the wharf, which is built under and around the steep cliffs on the northeast side and was known as Hooper's Wharf. The north shore of the bay has a low-water beach half a mile long under steep bluffs; thence eastward the shore is very rocky, the cliffs being about three hundred feet high, and covered with large forest trees as far as Little Trinidad River. The town, formerly the point of supplies for the mines in the interior, fronts on the north part of the roadstead over the moderately high bluff. The boat landing was on the north side of the round knoll making out about one hundred and twenty yards from the southeast side of the low neck and now known as the "Little Head."

In the bay lie eight or ten small rocky islets, moderately high and generally with good water around them. Four of them lie outside the three fathom line. In the approaches lie several larger rocky islets.

ROCKY ISLETS IN THE APPROACHES TO THE BAY.

Pilot Rock.—This rocky islet lies half a mile south of the Head. It is a conical, whitish rock, ninety yards in extent and rising one hundred and three feet above the sea. Its highest point lies half a mile (ten hundred and fifty yards) south thirteen and a half degrees east (S. 13½° E.) from the Light-house. There is eight or nine fathoms of water over a uniform bottom of fine gray sand close around it, so that vessels need have no fear of hidden dangers in approaching it. It is a fine landmark for the harbor. The depth of water between it and the Head decreases from eight and three-quarters fathoms to seven and one-quarter fathoms over sandy bottom.

Blank Rock.—This rocky islet lies nearly one-third of a mile off the western side of the Head and marks the outer limit of many shoal patches. It is nearly seventy yards in extent and rises one hundred feet above the sea, with steep sides. Its highest point is near the western side, and its exact position is eight hundred and fifty yards north eighty-three degrees west (N. 83° W.)

from the Light-house. There is good water, six to nine fathoms, close around it, but rocky and foul bottom to the north and also half-way towards Trinidad Head. A small *rock awash* lies one hundred and ninety yards southeast (SE.), or in the direction of Pilot Rock, from Blank Rock; and a *sunken rock*, with fifteen feet of water upon it, lies ninety yards from the rock awash in the direction of Pilot Rock, or two hundred and eighty yards from Blank Rock and on the range of the western edges of Blank Rock and Off Trinidad Rock. One-third of the distance from Blank Rock to Off Trinidad Rock, there is a low, black rock, thirty or forty yards in extent, with foul ground and reef stretching east northeast from it; and fifty yards southwest from this low rock lies a *rock awash*, with four and a half fathoms close outside of it. No vessel should go inside of Blank Rock.

Off Trinidad Rock.—This is a large, double-headed, rocky islet, lying three-quarters of a mile north sixty-seven degrees west (N. 67° W.) from the Light-house. It is two hundred and fifty yards long on the same bearing, and one hundred and thirty yards wide; the two heads are each about eighty feet above the sea. It has bold water, with foul bottom around it. The deeper water is on the northwest, west, and south faces; eight to nine fathoms are found close to the southeast point, and eleven to twelve fathoms two hundred and forty yards off the southwest face. From the east face stretches very broken ground more than half-way towards Trinidad Head. Half a mile to the northwestward of this rocky islet, and nearly on the prolongation from Blank Rock, there is a patch of foul ground with several breaks and one small rock awash at high water, and a smaller one awash at low water. A break is also reported three hundred yards off the southwest face, south fifty-nine degrees west (S. 59° W.) from the highest part. In that position the south point of Trinidad Head would be open to the north side of Blank Rock, one-third the width of the latter. No vessel should go inside of this islet.

In approaching the roadstead from the northwest, the line of safety is to keep to the southward of the range of Blank Rock, on with the southern edge of Trinidad Head until nearly up with Blank Rock, when the dangers just to the southeastward of it must be avoided.

Inside the bay or roadstead we have the following rocky islets and rocks above water:

Prisoners Rock.—This consists really of two rocks only ten yards apart and covering an area of about seventy by sixty yards, but generally seen as one rocky islet. The larger is seventy yards long by forty yards wide, and the highest point is sixty feet above the sea. It lies north fifty-five degrees east (N. 55° E.) from the south tangent of Trinidad Head, and two hundred and twenty yards from the eastern shore of the head. It lies one hundred yards north of the eastern line of visibility of the Trinidad Light. Six and seven fathoms of water are found close up to these rocks. The smaller rock lies under the southeast face of the larger and has a depth of thirteen feet of water close under its northeast end.

These two rocks seen from the southward resemble an animal lying down with its head up to the west.

Flat Rock is only fifteen by thirty yards in extent and quite low. It lies three hundred yards from Prisoners Rock on the line of the south part of the Rock and south point of the Head. It bears north fifty-seven degrees east (N. 57° E.) from the south point of the Head and is distant therefrom eight hundred yards; from the easternmost face of the Head it is distant six hundred yards. *A sunken rock* with only five feet of water upon it lies one hundred and fifty yards south forty degrees east (S. 40° E.) from Flat Rock. It has six fathoms of water immediately around it. It is mentioned under the head of Dangers. Three hundred yards east-northeast (ENE.) from Flat Rock lies the outer one of four scattered low rocks. This outer one lies in four fathoms of water, the others are inside the three-fathom line and not over two hundred yards from shore. A sunken *rock*, referred to under Dangers, is laid down one hundred and sixty-five yards northeast from Flat Rock. There is a depth of three and three-quarters fathoms immediately around this locality.

Double Head Rock.—This is a moderately low, rocky islet, about seventy yards long northwest and southeast and thirty yards across. The southern point lies three-quarters of a mile east eighty-two degrees east (N. 82° E.) from the Light-house and one-fifth of a mile broad off the shore. It has fourteen fathoms of water immediately around it, with the sunken "two feet rock" near it, and mentioned under Dangers.

There are numerous rocks and rocky islets under the northeast shore within the three fathom curve, and several other rocks above water lie in the northern part of the bay nearly three hundred yards from shore, but inside the three-fathom curve, and are good marks for that depth

Dangers.—There are a few sunken rocks in the bay, and a great many lie in the northwest approaches to it, most of them, however, inside of the line of visible rocks. These dangers are as follows:

The five-feet rock in the eastern part of the bay lies ninety yards north of the limit of east visibility of the Light and north sixty-five degrees east (N. 65° E.) half a mile from the south point of the Head. It has six fathoms of water close around it. It is marked by the Flat Rock, lying one hundred and thirty yards north forty degrees west (N. 40° W.) from it.

A *sunken rock* is laid down one hundred and sixty-five yards northeast (NE.) from Flat Rock, but no depth is given upon it and three and three quarters fathoms are found close around it.

The seven-feet rock lies two hundred and ten yards broad off the end of Hooper's Wharf. It is one hundred and fifty-five yards north twenty seven degrees west (N. 27° W.) from the highest part of Prisoners Rock, and three hundred and eighty yards north thirty-four degrees east (N. 34° E.) from the southeast point of the Head.

A *sunken rock* with five feet of water upon it was found only one hundred yards off Hooper's Wharf, about northeast by east (NE. by E.) from the inner end, and on the range of the eastern shore of the Head and Pilot Rock. Many vessels must have almost grazed this danger before the detailed hydrographic survey, when it was discovered. There is a depth of seventeen and eighteen feet of water around it.

The two-feet rock has only one and a half feet of water upon it. It lies one hundred and fifty yards southeast by east (SE. by E.) from the low Double-Head Rock already described, and has five and a quarter fathoms of water close around it. It lies four hundred and sixty yards from the eastern shore of the bay.

The four-fathom ledge has three and three quarters fathoms of water upon it, with deep water close around it. It is on the range of the Little Head and the right tangent of Prisoners Rock and three hundred and seventy-five yards from the latter. From the Light-house it bears north eighty nine degrees east (N. 89° E.) distant eight hundred and seventy yards. It has seven fathoms of water close to its south, east, and west sides, and five and three-quarters fathoms of water on the north side, deepening to seven fathoms.

In the approaches to the bay lie the following dangers:

Two rocks awash.—On the range of the highest point of Off-Trinidad Rock and the Light-house, bearing north fifty-seven degrees west (N. 57° W.) from the latter, and half a mile distant from Off Trinidad Rock, lies the larger of two rocks awash. The smaller one lies fifty yards north of it. The larger one is awash at high water, but the smaller one at low water only. A depth of fourteen fathoms of water is found close outside with rocky bottom; and seventeen fathoms over fine gray sand at two hundred yards outside.

Inside of these rocks, to the northeast and eastward, lie several other rocks awash and sunken rocks.

A *break* lies three hundred yards south of the larger of the foregoing rocks awash. It is very nearly west one third north (W. ⅓ N.) from the highest part of Off-Trinidad Rock. From the Light-house it bears north seventy-five degrees west (N. 75° W.), distant one and one-tenth miles. A line of thirteen-fathom soundings over irregular rocky bottom crosses this assigned locality.

The break two hundred and fifty yards south-southwest from the west end of Off-Trinidad Rock has been referred to in the description of that rock. It breaks often with the ordinary swell and low water. The bottom is very foul and irregular in this vicinity, and the hydrographic survey gives a five and a quarter fathom sounding at three hundred and twenty yards from the point on nearly the same bearing, with eleven fathoms around it.

A *fifteen-feet rock* lies six hundred and fifty yards south eighty-two degrees west (S. 82° W.) from the Light-house, and ninety yards from it in the direction of Blank Rock lies a rock awash; two of these were described under the head of Blank Rock. The fifteen-feet rock lies on the line of the west tangent of Blank Rock and Off-Trinidad Rock. Two other points of six and three-quarters and five and one quarter fathoms are found southeast from it, the latter two hundred and forty yards distant and nearly on the line to Pilot Rock, but the bottom is generally smooth.

There is a six and a quarter fathom shoal spot, with rocky bottom, one and one-fifth miles south four degrees west (S. 4° W.) from the Light-house. From this spot the west tangent of Pilot Rock is in range with the east tangent of the larger Prisoners Rock, and it is distant three-eighths of a mile from Pilot Rock. The extent of the patch within the ten-fathom line is about one hundred and fifty yards square; outside of it the soundings are very regular at eleven and a half fathoms. This is a good fishing shoal.

SAILING DIRECTIONS.

The *approaches to the bay* are free from dangers from the southeast to west-southwest, and vessels can work up close under the eastern shore if they keep outside the line connecting all the visible rocks and rocky islets bordering the shore. Coming from the west and northwest, a vessel passing half a mile south of the Off-Trinidad Rock can run on a southeast (SE.) course until the south point of the Head bears east-northeast (ENE.); then run as close around the Head as she can carry the wind, and, passing between it and Prisoners Rock, forereach the mooring-buoys. If the vessel is to anchor close in, the best anchorage is in seven fathoms of water over muddy bottom on the line between the south point of the Head and Prisoners Rock and half-way between them. In this position Hooper's Wharf is opened, and the south point of the Head bears southwest by west half west (SW. by W. ½ W.).

A vessel coming from the south and wishing to lie not closer than a quarter of a mile off the Head and rocks, should beat boldly in past Pilot Rock until Prisoners Rock and the Little Head are in range and the south point of Trinidad Head bears west by north (W. by N.), and anchor here in six and three quarters fathoms of water over a hard bottom of fine gray sand and mud. From this anchorage the low flat neck is visible to the westward of the Little Head, and a high, sugar-loaf rock beyond the neck shows over it. The four fathom ledge (see Dangers) lies two hundred and seventy-five yards to the north-northwest from this anchorage.

In summer, a west-northwest swell will generally be found setting in. In winter, it is a dangerous anchorage in southeast weather. Several vessels have been lost on account of insufficient ground-tackle; but the mill companies have placed moorings with heavy ground-tackle just inside Prisoners Rock, and vessels are reported to have ridden out strong southerly gales in safety at these moorings. It is said the sea never breaks at them, but that the force of the under-tow is strong.

Steamers generally run in between the Head and Prisoners Rock and lie at one of the mooring buoys.

Vessels do not lie at the wharf on the eastern side of the Head on account of the swell and under-tow; but they are moored bow-out a few yards from it, and the lumber is lowered to their decks by a derrick on the wharf. In the northeast part of the bay there are a saw-mill and a chute whence the lumber is taken on lighters to vessels at the moorings.

Tides at Trinidad Bay.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is $X1^h\ 27^m$. The mean rise and fall of tides is four and six-tenths feet; of spring tides five and seven-tenths feet; and of neap tides three and five-tenths feet. The mean duration of the flood is $6^h\ 16^m$, and of the ebb $6^h\ 09^m$, reckoning from the middle of each stand; the mean duration of the stand is $0^h\ 58^m$. The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is $1^h\ 07^m$ for the high waters, and $0^h\ 47^m$ for the low waters. The differences when the moon's declination is greatest are $1^h\ 46^m$ and $0^h\ 57^m$ respectively. The average difference in height of these two tides is one and four-tenths feet for the high waters, and two and three-tenths feet for the low waters. When the moon's declination is greatest, these differences are respectively two and one-half feet and three and eight-tenths feet. The average difference of the higher high and lower low waters of the same day is six and seven-tenths feet, and when the moon's declination is greatest, eight and three tenths feet. The higher high tide of the twenty-four hours occurs about $10^h\ 47^m$ after the moon's upper transit when her declination is north, and $1^h\ 38^m$ before when her declination is south. The lower of the low waters occurs about $7^h\ 00^m$ after the higher of the high waters. The greatest observed difference between the highest high water and lowest low water was nine and one-half feet.

To find the time and height of any tide throughout the year consult the Pacific Coast Tide Tables issued annually by the U. S. Coast and Geodetic Survey. For the required date take the times and heights for Astoria, and from the given time of high water subtract $1^h\ 08^m$, and from the height subtract one and six-tenths feet; from the given time of low water subtract $1^h\ 33^m$, and from the height subtract one-tenth of a foot.

The type peculiarities of the Pacific Coast tides were first observed at this port in June, 1[illegible] by Heceta and Bodega.

TRINIDAD HEAD LIGHT-HOUSE.

This is a primary sea-coast Light. The buildings for the Light are located on the southern pitch of the Head, sixty yards from the water and one hundred and eighty feet above the sea level.

The tower of the Light is a frustum of a square pyramid built of brick and painted white, and rising eighteen feet from the base to the focal plane. It is surmounted by a lantern, dome, and railing painted red. The illuminating apparatus is of the fourth order of the system of Fresnel. It was first exhibited in 1871 and shows from sunset to sunrise a *fixed white light varied by a red flash every minute.* The white light shows fifty-one seconds and the red flash nine seconds. (November 1, 1883.)

It illuminates the entire horizon, but, as the high ground of the Head cuts off part of the horizon, the arc of visibility over the water is two hundred and fourteen and a half degrees, extending from northwest by north (NW. by N.) round by west, south, and east to east by north one eighth north (E. by N. ⅛ N.). This includes Off-Trinidad Rock and the reef to the northwest of it and Double-Head Rock off the eastern shore of the harbor.

The focal plane of the lens is elevated one hundred and ninety-eight feet above the mean level of the sea, and the light should be visible, under favorable conditions of the weather, from a height of—

10 feet at a distance of 19.8 miles.
20 feet at a distance of 21.3 miles.
30 feet at a distance of 22.5 miles
60 feet at a distance of 25.1 miles.

The light-house keeper's dwelling is a two-story wooden building, painted white. It is situated about fifty yards to the northeast of the tower and about on the same level. The usual outhouses are at the rear of the dwelling.

The geographical position of the Light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	41° 03′ 01″	north.
Longitude	124° 09′ 03″	west.
Or, in time	8h 16m 36s.2	

The magnetic variation for January, 1885, was 18° 32′ east, with a yearly increase of 1′.1.

From the light-house we give the following bearings and distances to prominent objects:

Cape Mendocino Light-house (not intervisible)	S.		38⅝ miles.
Blunt's Reef, off Cape Mendocino	S.	34° W.	39¼ miles.
Whistling-buoy off Blunt's Reef	S.	5 W.	39½ miles.
Humboldt Light-house	S.	8 E.	17⅛ miles.
Humboldt Whistling-buoy, in 16 fathoms	S.	1¼ E.	17½ miles.
Crescent City Light-house (not intervisible)	N.	21½ W.	42½ miles.
St. George's Reef, proposed light-house* (not intervisible)	N.	30 W.	48¾ miles.
Cape Orford Light-house (not intervisible)	N.	28 W.	108¾ miles.
Fox Rock, off the Orford Reef (not intervisible)	N.	30 W.	105½ miles.

This light was originally established as a revolving r[illegible]ight and was first exhibited December 1, 1871.

There is no fog-signal at this light-station.

The secondary astronomical station of the Coast Survey in 1853 w[illegible]n the neck just up from the boat landing. Its geographical position is:

Latitude	41° 03′ 20.0	north.
Longitude	124° 08′ 15′	west.
Or, in time	8h 16m 33s.0.	

The *town of Trinidad* has greatly improved. The lumber interest is very great and agriculture has very largely developed. The soil is rich and winter rains are abundant. The redwood trees in the vicinity grow to an enormous size. The stump of one we measured in 1853 was about twenty feet in diameter, and a dozen trees standing in the vicinity averaged over ten feet. The trees grow with perfectly straight trunks, retain their thickness to a great height, begin to branch at fifty to one hundred feet, and frequently attain two hundred and fifty feet in length.

"El Puerto de la Trinidad" was discovered June 10, 1775, by Heceta and Bodega, who anchored there in seven fathoms over coarse sand and spent nine days in surveying it, placing it in latitude 41° 07′. They made a good plan of the bay, and ascended the Rio de los Tortolas or Pigeon River, now called the Little Trinidad River, for one league. On the 8th of June, before making the land, when twenty-five miles north of Trinidad and thirty miles off the coast, they found that a

* The northwesternmost rock of the Crescent City Reef.

current to the south had carried them twenty-nine miles south of their calculated position in one day of calm weather. On the 11th of June they "took possession" of the country and gave the port its present name. Here they bartered and obtained from the natives some badly made knives of iron that seemed to be pieces cut from old sabres which they had obtained from the northward; one was marked with an (L). They found three hundred Indians of both sexes.

It was visited in May, 1793, by Vancouver, who says (Vol. II, page 245):

In an excursion made by Mr. Menzies to the hill composing the projecting headland that forms the northwest side of the bay, he found, agreeably with Señor Maurelli's description, the (wooden) cross which the Spaniards had erected on their taking possession of the port; and though it was in a certain state of decay, it admitted of his copying the following inscription: "Carolus III. Dei G. Hyspaniarum Rex."

Vancouver placed it in latitude 41° 04′ north. (Vol. I, page 200.)

The Indian name of the bay is Sho'-ran.

In the charts of the United States Exploring Expedition, 1841, the indentation of the coast between Mendocino and Trinidad was called "Bay of Trinidad;" this included Humboldt Bay as part of the bight.

A preliminary chart of the bay was published by the Coast Survey in 1851, and in 1875 a careful hydrographic survey was completed of the bay and its approaches from the north and south.

The hydrography in the approaches to Trinidad Bay.—From the southward up to abreast of Mad River the ten-fathom line of soundings is found about one mile from shore; thence it gradually leaves the shore to two miles abreast the Little Trinidad River, where the five-fathom line, over fine gray sand and mica, is within three-quarters of a mile of the shore, and the low water beach is three hundred yards broad.

Abreast of Trinidad Head the ten-fathom line of soundings is nearly half a mile from shore over a bottom of fine gray sand, with rock in some places; the twenty-fathom line is two and a quarter miles distant, over fine gray sand, shells, and mica; and the thirty-fathom line is four miles out, over bottom of fine gray sand, and sometimes mica. Outside of thirty fathoms the bottom changes to fine gray sand and mud, and the forty-five fathom soundings five and a half miles out are over soft green mud. The one hundred-fathom line is nine and one-third miles off shore, with the bottom hard brown mud. The two-hundred-fathom line is twelve miles out and appears to approach the coast to the northward; the bottom is hard brown mud.

DEEP-SEA SOUNDINGS.

On the 28th and 29th of October, 1873, a line of deep-sea soundings was run by the U. S. steamer *Tuscarora* to the westward of Trinidad Head to the deep plateau of the Pacific, and thence a short line parallel with the coast. They are as follows:

Distance and bearing from Trinidad Light.	Latitude.	Longitude.	Depth (fathoms).	Temperature of water (Fahrenheit).	Character of bottom.
Miles.					
8 S. 56 W.....	41 01	124 19	66	46.9	Clay, mud, and fine sand.
13 S. 57½ W.....	41 00	124 27	261	.....	Whitish clay, ooze, fine sand.
20 S. 61 W.....	41 00	124 35	358	.....	Clay ooze.
29 S. 66 W.....	41 01	124 48	966	35.8	Do.
40 S. 68 W.....	41 02	125 04	1,666	34.7	Do.
50½ S. 69½ W.....	41 03	125 16	1,698	.....	Do.
67 S. 71 W.....	41 03	125 38	1,666	.....	Whitish clay ooze, calcareous minute shells.
103 S. 67 W.....	40 56	126 27	1,703	.....	Greenish clay ooze.
135 S. 68 W.....	40 54	127 09	1,521	.....	Greenish clay and ooze and particles of sand.
135 S. 73 W.....	41 07	127 10	1,499	.....	Clay ooze.
137 S. 77 W.	41 16	127 12	1,356	.....	Calcareous sand with black specks and shells
151 S. 82 W.....	41 29	127 27	1,667	.....	Clay and brown ooze.
138 S. 83 W.....	41 30	127 11	1,721	.....	Greenish clay.
127 S. 84½ W.....	41 32	126 54	1,689	35.1	Clay ooze.
144 S. 82½ W.....	41 30	127 11	996	34.9	Rock, particles of black sand.
177 S. 83½ W.....	41 38	128 03	1,707	.....	Brown ooze.
221 S. 85½ W	41 54	128 59	1,805	34.2	Yellow brown ooze.

These soundings plainly show that the deep plateau of the Pacific is not so close to the shore off this part of the coast as it is to the southward of Cape Mendocino.

ROCKY POINT.

The coast-line running five and a half miles north twenty-two degrees west (N. 22° W.) from Trinidad Head to Rocky Point is rocky, with moderately high cliffs, rising one hundred and twenty feet above the sea, and bordered by great numbers of rocks and small rocky islets, mostly within half a mile from the shore, although three of them are a mile out, and hidden dangers lie nearly as far from shore. The summit of the cliffs is covered with forests of redwood sparsely fringed with oak and scrub pine to the edge.

Rocky Point is nearly half a mile broad, north and south, with a slight indentation on the southeast side, and a sharp sweep of half a mile to the eastward on the north side of it. The shore is bold and the cliffs reach two hundred feet in height. It is bordered by rocks which lie two hundred to three hundred yards off shore; and it has no low-water beach except a few narrow stretches on the north shore. The general surface of the point is about two hundred and thirty feet above the sea, and is covered with oak and scrub pine for half a mile back to the great redwood forest. Above and through this oak forest rise two bare rocky points or pinnacles; the one within two hundred and twenty yards of the shore is two hundred and fifty feet, and the inner one is two hundred and seventy feet high.

Three-quarters of a mile from Trinidad Head, along the coast towards Rocky Point, there is a small rounded point projecting somewhat from the general trend of the shore and leaving a cove between it and the Head. It is full of visible rocks and hidden dangers. Two and three-quarters miles northwestward from the Head there is a narrow, sharp point, locally known as Scotty's Point. It is only two hundred yards long and seventy yards wide. At four and two-fifths miles from the Head is a moderately broad and sharp-pointed projection, locally known as Patrick's Point.

With these jutting, ragged points and the indentations between them filled with rocks, and with the outlying rocky islets and dangers, the shore is inaccessible to boats.

The following details describe the shoal stretch of coast from Trinidad Head to Rocky Point.

Blank Rock and Off-Trinidad Rock, with the dangers in the immediate vicinity of them, have already been described. (See Rocky Islets in the approaches to Trinidad Bay, pages 331–333.)

Green Rock.—This rocky islet, so named from its grassy summit, is one hundred and eight feet high and one hundred and fifty yards in extent. It lies five hundred and fifty yards off shore, and one and three-fifths miles north forty-three degrees west (N. 43° W.) from Trinidad Light-house, but nearly half a mile shoreward of the line of visibility of the Light. Soundings are not laid down near it. Many small visible rocks lie inshore. The twenty-fathom line of soundings lies nearly two miles broad off shore abreast of Green Rock.

A *Rock awash* at high water lies south seventy-five degrees west (S. 75° W.), distant seven hundred yards from Green Rock. From the Light-house it bears north fifty-three degrees west (N. 53° W.), distant one and one-quarter miles, but it is one hundred and fifty yards shoreward of the line of visibility of the Light. Within two hundred yards of it there is a depth of fifteen fathoms of water over rocky bottom.

A *Four-fathom sunken rock* lies half a mile south sixty-six and a half degrees west (S. 66½° W.) from Green Rock, and one and a quarter miles north fifty-seven and a half degrees west (N. 57½° W.) from the Light-house. It is just seaward, or within the arc of visibility of the Light, and the western tangents of Off-Trinidad Rock and Blank Rock are nearly in range. It has fifteen fathoms of water around it, with foul bottom and eight to ten fathoms of water for half a mile in the direction of the Light-house. It breaks very seldom.

Two sunken rocks lie north fifty degrees west (N. 50° W.) three-fifths and four-fifths of a mile from Green Rock, and north forty-five degrees west (N. 45° W.) two and one-fifth and two and two-fifths miles from the Light-house. The former has thirteen and three-quarters fathoms of water close to the southeast, but no soundings are laid down hence to the northern rock. At one-quarter of a mile northwest from the northern breaker there is a depth of fifteen fathoms, and seventeen fathoms about three-tenths of a mile to the westward. Both rocks lie shoreward of the arc of visibility of the Light.

White Rock, so called from its appearance, is a high islet forty by eighty yards in extent and one hundred and thirty feet above the sea. But it lies only two hundred and fifty yards off a small, projecting, wooded head, one hundred and forty feet high. It lies three-quarters of a mile north of Green Rock, and one and seven-eighths miles from Trinidad Head.

Another inshore rocky islet, seventy-five yards in extent and one hundred and fifty feet high lies three-fifths of a mile off shore, and two and seven-tenths miles north thirty-three degrees west (N. 33° W.) from the Light-house.

Cone Rock, named from its shape, is only thirty by sixty yards in extent and forty feet above the sea. It lies three and three-quarters miles north forty-two degrees west (N. 42° W.) from the Light-house, and over the east tangent of Green Rock. It is isolated, and lies one mile off shore and three-fifths of a mile outside the shore rocks. There is a depth of fifteen fathoms of water close around it, with the soundings decreasing to twelve and a half fathoms in half a mile eastward to a small rock forty feet high. Seven-tenths of a mile outside of Cone Rock the twenty-fathom soundings are over a bottom of fine gray sand; and the thirty-fathom line is just two miles distant over similar bottom.

The Turtles.—These are two small rocky islets one mile broad off Rocky Point. They are two hundred and thirty yards apart on a northwest half west bearing. The northern or outer Turtle is sixty by forty yards in extent and twenty feet high; the southern or inner Turtle is about one-half the extent of the outer, but fifty feet above the sea. From the northern extremity of Rocky Point the outer Turtle bears south forty-five degrees west (S. 45° W.) distant one and three-tenths miles; and from Trinidad Light-house it bears north thirty-five and a half degrees west (N. 35½° W.) distant five and one tenth miles; but it is nearly two miles shoreward of the line of visibility of the Light.

There is deep water, fifteen to sixteen fathoms, within two hundred yards around the Turtles, over bottom of fine gray sand. The bottom inside them is foul, with *two breakers*, three-tenths and four-tenths of a mile east of the outer Turtle, and then visible rocks towards the shore. These rocky islets are a favorite resort of seals and sea-lions.

The twenty-fathom line of soundings is half a mile outside the outer Turtle, over bottom of fine gray sand and broken shells, and the thirty-fathom line one and a half miles out, over similar bottom; the forty-fathom line is two and a half miles outside, over a bottom of sand and mud.

The Turtles were named by the Coast Survey in 1850.

Soundings off Rocky Point.—The ten-fathom line of soundings is only half a mile from shore, over bottom of fine gray sand and mica; the twenty fathom line is one and three-tenths miles off, over fine gray sand; the thirty-fathom line is two and a half miles distant, with bottom of fine gray sand, mica, and broken shells; and the forty-fathom line is four miles from shore, with sandy and muddy bottom, sometimes sticky.

Vessels running south past Rocky Point and bound to Trinidad Bay should give the Turtles and Cone Rock a berth of half a mile and continue on their course until the Light is opened, when they can generally haul in and follow the directions already given.

From Rocky Point we have the following directions and distances to important objects:

Whistling Buoy off Blunt's Reef	S.	2° W.	43½ miles.
Cape Mendocino Light-house	S.	4° E.	43 miles.
Whistling Buoy off Humboldt Bar	S.	7° E.	22 miles.
Humboldt Light-house	S.	13° E.	22 miles.
Trinidad Light-house (not intervisible)	S.	22° E.	5¼ miles.
Redding's Rock	N.	21¼° W.	13¼ miles.
Crescent City Light-house	N.	21° W.	37 miles.
St. George's Reef * (proposed light-house)	N.	30½° W.	43 miles.
Fox Rock, Orford Reef	N.	28° W.	100½ miles.
Cape Orford Light-house	N.	28° W.	103½ miles.

The geographical position of the outer one of the two rocky pinnacles rising above the sea on Rocky Point has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	41°	08′	17″.8 north.
Longitude	124°	09′	28″.7 west.
Or, in time		8ʰ	36ᵐ 37ˢ.9.

The magnetic variation was 18° 33′ east in January, 1885, and increases 1′.1 annually.

Vancouver noted the broken and rocky stretch of shore hence to Trinidad Head, and named its projection Rocky Point; but on the chart the name is applied close to the Head. He placed it in latitude 41° 08′.

* The northwesternmost rock of the Crescent City Reef.

On Tebenkoff's chart it is named Cape of Rocks (outlying or detached).

The Landfall for the vicinity of Trinidad Head and Rocky Point for vessels approaching the coast from seaward is very good. The mountain masses eastward of this locality attain elevations of over three thousand feet within ten miles of the shore, and of more than four thousand feet at less than twenty miles from the coast.

Between latitudes 40° 59′ and 41° 15′, and ranging from five to eight miles eastward of Trinidad Head, there are at least eight peaks that can be seen over fifty miles at sea. The one that is first made out is *Trinity Mountain*, three thousand and twelve feet above the sea, and lying five miles northeast by east (NE. by E.) from Rocky Point. It is in latitude 41° 09′ 40″ north, longitude 124° 01′ 30″ west, and can be seen at fifty-eight miles outside of Rocky Point.

Mount Hoopah.—This is the highest of the coast mountains immediately behind Trinidad Head, but it is hidden by Trinity and other mountains when a vessel is moderately close under the land. It is in latitude 41° 09′ north, longitude 123° 37′, and is visible at a distance of seventy miles.

Mount Kimet.—This is a bare and rocky summit reaching an elevation of four thousand one hundred and eighty feet; it lies forty-two miles north forty and a half degrees east (N. 40½° E.) from Trinidad Head, and forty-three and a half miles north eighty-seven degrees east (N. 87° E.) from Redding Rock. It is the culminating peak of the Humboldt Mountains, which crowd down in the sharp bend of the Klamath River, about thirty-five or forty miles in from the coast. The mountains between it and the coast reach elevations of twenty-eight hundred and ten and twenty-nine hundred and fifty feet between the Klamath River and Redwood Creek. The geographical position of Mount Kimet is latitude 41° 29′ north, longitude 122° 25′ west, and it is visible at a distance of seventy miles.

Some of these mountains are seen by a vessel when up with Cape Mendocino, and when off the Dragon Rocks of the Crescent City Reef.

Redding Rock.—When abreast of Rocky Point, in latitude 41° 08′, Redding Rock is visible from a vessel's deck, and with the morning sun shining upon it presents the appearance of a whitish cone of equal sides and base. When seen from the west-southwest, the northern face is nearly perpendicular and the southern face slopes about one in two, with a whitish surface and dark base. When seen from the west-northwest at a distance of four miles, it appears as a truncated mass having a height of two-thirds the base, with a very slight inclination to the northeast; the base is dark for one-third the height, then white with a scar in the southern face. The white deposit is doubtless from birds, and may be washed off in winter. Its elevation is eighty-three feet above the sea, and our estimate would make this rocky islet about sixty or seventy yards in extent north and south. It is reported to have deep water all around it; but its vicinity has not been surveyed. We have been informed that a reef, commencing at the shore two miles above the rock, stretches out a short distance towards it, but no breakers are seen three-quarters of a mile from shore. Vessels do not go inside of it.

Redding Rock lies four and a half miles broad off Gold Bluff in latitude 41° 20′ 22″ north, longitude 124° 11′ 36″ west. It is almost on the line between Rocky Point and Crescent City Light-house. From it we have the following bearings and distances to important points:

Rocky Point	S. 20° E.	12¼ miles.
Crescent City Light-house	N. 21° W.	25 miles.
Northwest Seal Rock, Crescent City Reef [proposed light]	N. 33½° W.	30¾ miles.

Vancouver places Redding Rock in latitude 41° 25′ on his chart, and four miles off shore; but in the narrative states the distance at half a league, and that it is half a mile in circuit. His rock lies inside of it.

Tebenkoff calls it Bird Rock. It received its present name from Lieutenant McArthur in 1850, in honor of B. B. Redding, of California.

In January, 1603, Vizcaino's vessels were separated during heavy southeast weather, and one of them "being in forty-one degrees of latitude ran before the wind, and very near to Cape Mendocino, she found shelter under a large rocky islet, where she remained at anchor until the storm had passed; and after the wind had lulled the ship continued her course northward close under the land." The context shows that he was northward, or in the vicinity of Cape Mendocino, when the storm commenced; and his latitude may be accepted as nearly correct. We are satisfied that his vessel anchored under the lee of this rocky islet.

COAST-LINE NORTH OF ROCKY POINT.

From Rocky Point the shore line falls back two-thirds of a mile to the east northeast, changing its characteristics from rocky cliffs with outlying rocks to a low shore with sandy beach for a few miles northward. The general course from this head to Ossegan Creek, at the northern end of the Gold Bluffs, in latitude 41° 26′, longitude 124° 04′, is north by west (N. by W.) and the distance eighteen and one-quarter miles; it then trends northwest by north twenty miles to Crescent City.

Only a mile and a half northward of the indentation behind Rocky Point begins the southern part of *Big Lagoon*, which lies behind a narrow sand ridge three miles long to the opening of the lagoon upon the ocean. The southeastern part of the lagoon widens to more than a mile; the northern part decreases in width to the mouth, which sometimes is over one hundred yards broad; but it is reported that there are seasons when it is closed. The Indian name of this lagoon is E-shoe-sho-ran.

Gihons Bluffs.—Northward of Big Lagoon the cliffs recommence, but they are wholly different from those at Rocky Point, being composed of easily washed material which the sea undermines. They extend two miles to abreast *Stone Lagoon*, which stretches to the southeast nearly two miles and, at the time of the reconnaissance, was closed by a narrow sand barrier one mile long between two rocky heads. In the middle of Gihons Bluffs there is a high point, slightly projecting beyond the general line of the bluff, with visible and sunken rocks around it. The outermost visible rock lies one-third of a mile to the northwest of the point.

Seven and three-quarters miles north from Rocky Point, and at the north end of the beach in front of Stone Lagoon, is a high projecting point with precipitous face to the south and sharply sloping to the north, where a low sand spit continues north for half a mile to a second rocky head, and thence another half mile to the southern end of the Gold Bluffs. Behind each beach is a fresh-water lagoon, and into the northern one empties Redwood Creek.

Three-quarters of a mile off the precipitous point just described as seven and three-quarters miles from Rocky Point, lies the outermost of a series of rocks hence to the sharp head in the middle of Gihons Bluffs. This outer rock lies southwest by west half west (SW. by W. ½ W.) from the point. All the country behind this stretch of the coast is covered with forests.

Gihons Bluffs are not now locally known by that name.

Gold Bluffs.—The southernmost part of this line of cliffs, similar in character to the preceding, may be considered at the north side of Redwood Creek, and is marked by two hillocks close on the shore. It is nine miles north of Rocky Point. There are three or four rocks lying twenty-five yards from the cliffs at this point. Thence the line of cliffs runs north three-quarters west (N. ¾ W.) for nine miles in a very straight line. For the first three miles the cliffs are moderately low, and some rocks and rocky islets lie as far as two-thirds of a mile off shore. Almost directly west of a slightly projecting head called *Mussel Point*, which is two and one-quarter miles from Redwood Creek, lies Redding Rock, four and one-third miles off shore and elsewhere described.

(See page 339.)

The line of cliffs is broken at four miles from the southern end by two moderately broad valleys, in the southern one of which are located the dwelling-houses of the mining claim. A creek breaks through the cliff two miles south of the Ossegan, and there are some houses on the north bank, back from the coast-line.

The "Gold Bluffs" form a line of nearly vertical cliffs rising directly above a low-water beach from one hundred to five hundred feet above the sea. The back ridges are densely forested to the very edge of the cliff. The entire cliff is auriferous gravel, gray and black sand (magnetic oxide of iron). The sea washes square against the base of the cliffs at high water so that it is not practicable to pass along the beach; and in winter, and during heavy storms, great masses of the cliff fall from the undermining by the waves. At low water this gold-bearing sand is gathered and packed on mules to the refining works. These sands have been worked continuously since 1850 or 1851, and although attempts have been made in vessels prepared with machinery to take up the sand, and also with the diving-bell, no method has proved equal to that of the well-trained mule.

The coast from Gold Bluff to Crescent City Light-house is very nearly straight, and the general trend north thirty-eight degrees west (N. 38° W.) for the distance of nineteen and two-thirds miles. It recedes to the eastward of this line one mile at the Klamath River, one and a half miles at the False Klamath, and nearly two miles just south of Crescent City Bay. The shore line

changes wholly from the Gold Bluffs, being thence quite irregular, broken, and bordered by many rocks. Above the bold cliffs the lower hills are covered with chaparral, and the higher hills with forests of redwood and fir. There are two or three dangers to navigation that extend one mile from shore, to be mentioned in their proper places.

THE KLAMATH RIVER.

Seven miles north thirty degrees west (N. 30° W.) from the northern end of Gold Bluff, and twenty four and a half miles north ten degrees west (N. 10° W.) from Rocky Point, is the mouth of the Klamath River under the high land at the north side of the river valley. At the river opening, for one and one-third miles south of the north head, there is a long, straight sand beach to Flint Rock Head. This line of sand forms a narrow peninsula stretching from the south head towards the north head, and so throws the channel of the river close under the rocky shore of the latter. The width of the river valley between the high lands north and south is four fifths of a mile at the mouth, and it maintains this width about a mile inland.

Along the coast to the southward of the river the rising hills are covered with grass and low bushes for a short distance back to an elevation of about seven hundred feet, and then begin the forests which cover all the higher ground. This feature continues to the mouth of the river. When close inshore, rocks are seen for a mile immediately under the cliffs north of Gold Bluff; then a few straggling ones at two and at three miles from the same point, and at the latter distance one double rock lies one-third of a mile off shore and two-thirds of a mile south of Split Rock.

Split Rock is a slightly projecting head three and a half miles from the northern end of Gold Bluff and the same distance to the southward of the mouth of Klamath River. It is so named from a great cut in its north face. The cliffs hence to Flint Rock Head are bordered by visible and sunken rocks and one high, rocky islet, but none of these extend four hundred yards off shore.

The high, rocky islet is *White Rock*, one hundred and seven feet above the sea and eighty yards in extent. It lies one-sixth of a mile off shore and has many sunken and visible rocks between it and the shore. Its south face is very precipitous and the west face steep and sloping to the north. It lies about six hundred yards north seventy-three degrees west (N. 73° W.) from the shore under *High Bluff*, a slightly projecting head half way between Split Rock and Flint Rock marked by an enormous chasm on its north side, reaching back to the height of two hundred and eighty feet. The highest part of High Bluff is on the south edge of this chasm, and one hundred and thirty yards in from the shore-line; it rises three hundred and forty feet above the sea.

Flint Rock Head is a detached, rocky head, one hundred and thirty-five feet high and about one hundred yards in extent. It lies about one hundred yards from the high land at the southern limit of Klamath River sand beach, which stretches one and one-third miles from the mouth of the river, and is connected with the cliffs of the high shore by the low sands. It has a precipitous face to the southwest and slopes to the northeast. Visible and sunken rocks lie within two hundred yards all around it, and stretch hence to White Rock.

A *rock awash* lies abreast of the south head of the Klamath two thirds of a mile north sixty-three degrees west (N. 63° W.) from Flint Rock Head, and south nine degrees west from the mouth of the river under the north head.

On the north side of the river the coast-line trends to the west-northwest for nearly a mile, then curving gradually to the northwest and north-northwest to the False Klamath, three miles to the northward of the mouth of Klamath River. Under the cliffs of this rounding shore lie many rocks, visible and sunken, but none over three hundred yards from shore except two, which with the rock awash lying two thirds of a mile from Flint Rock Head constitute the three dangers in the immediate approaches to the entrance. They are as follows:

A *rock*, seventeen feet above water and about fifty yards in extent, lies north sixty-two degrees west (N. 62° W.) two and two-thirds miles from the mouth of the river and one mile broad off the nearest shore. It lies one mile south by west (S. by W.) from False Klamath Rock.

A *sunken rock* lies north eighty-one degrees west (N. 81° W.) one and three-eighths miles from the mouth of the river, five-eighths of a mile off the nearest shore, and south forty-four degrees east (S. 44° E.) one and three-eighths miles from the preceding rock above water.

White Rock, off High Bluff, the rock awash lying two-thirds of a mile from Flint Rock Head, and these two last-mentioned dangers lie in an almost straight line northwest and southeast from

each other. There are other dangers in the immediate vicinity of False Klamath Rock, hereafter described.

The high land on the north side of the river for more than a mile from the mouth is covered with grass and bushes to a crest-line about nine hundred feet above the sea, and then begin the dense forests of pine and redwood. This feature of the immediate seaboard is continued northward, but the grass-covered slopes gradually decrease in height to abreast the False Klamath Rock, where they are only two hundred feet above the sea. The highest point in this grassy crest-line is called *Council Mound*, nine hundred and sixty-one feet above the sea and three-quarters of a mile north thirty-two degrees west (N. 32° W.) from the mouth of the river.

The Klamath River is one of the larger rivers in California, and drains an immense area of mountainous country. The mouth of the river is in latitude 41° 32½′ north and longitude 124° 05′ west. In 1874 the narrow entrance under the north head was about one hundred and eighty yards wide at high water and only fifty yards wide at low water. There is a short bar outside the entrance, and the surf is usually heavy. No reliable information can be given of the depth of water upon this bar, because it varies with the season and in different years and changes with every change of heavy weather. In 1851 and in 1860 it is reported that the mouth was closed, as frequently occurs with other rivers on the coast. Lieutenant McArthur reported in 1850: "The river has seventeen feet of water on the bar at mean low water. It is not difficult of entrance with a good breeze, but very difficult to get out of, the current running so strong that sailing vessels must come out stern foremost to be steered." His chart shows, however, that he did not enter the river, nor was he nearer than one mile of it. In 1853 we passed the mouth of the river in fair weather within less than a mile when the sea was breaking across the entrance, and no appearance of a safe channel was presented. In 1860 the tug from Humboldt Bay (drawing less than ten feet of water) endeavored to enter the river, but could not find sufficient water, although the sea was very smooth. When the swell came in on the second day she had to throw her remaining freight overboard and put to sea. Nevertheless small schooners have traded here, and once inside they find plenty of water, and the tide flows about five miles up the river. In August, 1887, the coasting steamer *Thistle* made three trips to the Klamath for salmon.

The hydrographic survey of the coast has not yet been extended to the southward as far as the Klamath River.

In a recent publication we find the following erroneous description of the bar of the Klamath:

> There is a bar at its mouth which can be crossed at high water by ships of the line, and at low water by boats only.

In the reconnaissance of 1874, the party swam their horses across the river because there was no ferry. There was a large Indian village on the north shore just inside the river, the "Requa" village of the Klamaths; and under the south head the "Guiloh-pack" village of the same tribe. The river banks are covered with fine forests of redwood, fir, and laurel. Salmon are plenty and of fine quality.

The name is derived from the tribe of Indians inhabiting the valley of this stream. On Tebenkoff's chart of 1848 it is called the Tlamack, and as the Russians explored this coast very closely as early as 1806 there is no doubt they obtained the name from the natives.

LANDFALL OFF THE KLAMATH.—MOUNT TOORUP.

This is the culminating peak of the mountains closing upon the coast near the Klamath River. It is only eight miles east of the mouth of that stream, and is seen directly up the valley. It is visible from Crescent City Bay, St. George's Reef, and from the vicinity of Redding Rock. It lies twenty-one and a half miles south sixty-five degrees east (S. 65° E.) from Point St. George, and sixteen miles north twenty seven degrees east (N. 27° E.) from Redding Rock. It rises to a thousand and sixty-five feet above the sea, and should be visible at a distance of sixty-four miles from the coast abreast the Klamath River. Its approximate geographical position is latitude 41° 32′ north, longitude 123° 50′ west.

False Klamath.—For three miles along the coast to the northwest of the Klamath River the characteristics to the southward are repeated. High, irregular, jagged cliffs, bordered by many rocks extending as far out as four hundred yards, and above the cliffs sloping hills covered with grass and chaparral to the forests which clothe all the higher parts, continue to the southern point of the False Klamath. Off this short stretch of the coast lie the dangers described under the head of Klamath River.

The slight, but sharp, indentation known as the False Klamath is at the opening of a small stream, locally known as *Wilson's Creek*, coming between high hills of a thousand feet elevation. The cove is about half a mile in extent. There is a short sand beach clear of rocks just inside, or to the northeastward, of the south point of the cove, and through it empties a very short stream which drains the half-mile long valley to the eastward of the ridge forming the point. Wilson's Creek empties into the northern part of the cove, where the forest comes very nearly to the beach; there are some houses on the slope to the southward of the mouth. The beach in this part of the cove is covered with rocks.

The cove appears larger on account of the line of rocks and rocky islets stretching nearly half a mile west from the south point. There is no safe anchorage here whatever as the cove is filled with rocks, both visible and sunken, although there is a depth of from four to six fathoms of water close of, and between these dangers.

In the earlier days the approaches to this cove were sometimes mistaken for those of the Klamath River, hence its name. Wilson's Creek was named Ahmen Creek on the State map of California.

False Klamath Rock, the principal rocky islet off the south point of the cove, lies six hundred and fifty yards south sixty-four degrees west (S. 64° W.) from the point, nine and three-quarters miles south forty-four degrees east (S. 44° E.) from Crescent City Light; and twenty-seven and a half miles north fourteen degrees west (N. 14° W.) from Rocky Point. It is round-topped, much larger, higher and more noticeable than any other rock on this section of the coast, it being one hundred and fifty yards in extent and one hundred and ninety-five feet high. The mouth of Wilson's Creek lies seven eighths of a mile north twenty degrees east (N. 20° E.) from this islet. Smaller rocks stretch out from the point one-third of the way towards this islet, and sunken rocks and rocks above water lie within four hundred yards southeast and northwest of it. Between it and the rocks nearer the point there are depths of four to six fathoms of water; outside of it the water deepens rapidly, but a *dangerous sunken rock* lies in deep water almost half a mile outside of it on the continuation of the line from the south point of the cove. This *sunken rock*, locally known as the *Wilson Rock*, lies directly off the False Klamath Cove, nearly one mile off the southern point of Wilson's Creek, and nine and three-quarters miles southward of Crescent City Light-house, with fifteen to eight fathoms of water between it and the False Klamath Rock. The rock has only three feet of water upon it; the top is circular and about four feet in diameter. Within two boats' lengths around it the depth is fifteen and one-quarter fathoms; upon a projecting shoulder there was found four and a half fathoms. The sea rarely breaks upon it, and it can not be otherwise distinguished at a ship's length, especially as there is no kelp to mark it. From it are given the following bearings and distances to locate the position: Sister Rocks bear northwest by north, distant four miles, and False Klamath Rock north seventy degrees east (N. 70° E.), distant nearly half a mile. Far Island, half way inshore, east by north (E. by N.), one-half mile.

This rock was first located as a break in 1871, but afterwards examined thoroughly in the hydrographic survey.

South seventeen degrees east (S. 17° E.), distant six-sevenths of a mile from the Wilson sunken rock, or south by west (S. by W.), distant one mile from the False Klamath Rock, lies the rock, seventeen feet above water, already described under dangers in the approaches to the Klamath River; and north twenty-three degrees west (N. 23° W.), distant two-thirds of a mile from the Wilson Rock, or north fifty-five degrees west (N. 55° W.), five-sixths of a mile from the False Klamath Rock, lies a *rock awash*. These two rocks are the outermost dangers off the False Klamath Rock, and the Wilson sunken rock lies a little inside of the line joining them. Inside of this line, especially to the northeastward of the northern one, lie many sunken rocks and rocks awash; it is not safe for a vessel to pass, or to allow herself to be set inshore of this line.

Hydrography off the False Klamath.—Broad off the coast at this place, in a west-southwest direction, the soundings are sixteen fathoms of water over fine dark gray sand at one mile outside the False Klamath Rock; eighteen fathoms over fine sand and yellow mud at two miles; twenty fathoms over dark gray sand and yellow mud at three miles; twenty-four fathoms over sand and mud at four miles; and twenty-six fathoms over sand and mud at five and a half miles. These observations show how uniform the bottom is within these limits.

The coast-line northward from False Klamath to Crescent City is bordered by bold, rocky cliffs for seven miles to the broad sandy beach thence to Crescent City. Along this stretch of seven miles the hill-slopes are covered with chaparral and grass to seven hundred feet above the sea,

but the face of these slopes is cut by many breaks in the surface. Above this open hill-side the forests of redwood, fir, and laurel cover the higher parts to the crest-line at twelve hundred to fourteen hundred feet elevation. The immediate shore is bordered by many rocks, and the three-fathom line is rarely over three hundred yards out. At one and a quarter miles northward from False Klamath Rock the three-fathom line is directly under the slightly projecting knob; and abreast the Sisters it lies within one hundred yards of the shore. But off this stretch of the coast lie a rock awash, two dangerous sunken rocks, and two patches of visible rocks, all in deep water.

The *first danger* north of False Klamath is the *rock awash*, already referred under the description of the Wilson Rock, lying five sixths of a mile north fifty five degrees west (N. 55° W.) from the False Klamath Rock. It lies three-quarters of a mile from the nearest shore, and has fourteen fathoms of water close around it with a bottom of fine dark-gray sand. It is about twenty-five yards in extent.

A double *sunken rock* lies two hundred and seventy-five yards south twenty-three degrees west (S. 23° W.) from the shore of the first point one and one-third miles north of False Klamath Rock. There is a depth of eleven fathoms of water close to it.

Another *sunken rock*, having four feet of water upon it, and nine to twelve fathoms moderately close around it, lies north seventy-three degrees west (N. 73° W.) nearly one-third of a mile off this same point.

The *Sister Rocks* are a prominent cluster of rocks nearly midway between the Klamath River and Crescent City; being seven miles north forty-one degrees west (N. 41° W.) from the former, and five and four fifths miles south forty-six degrees east (S. 46° E.) from the Light-house at Crescent City. They lie half a mile west of the nearest point, which rises very boldly to eight hundred and twenty feet elevation at the forest line only eight hundred yards back. This point is locally known as Midway Point. The cluster contains only three large rocks and two or three very small ones, and covers an area of not over one hundred and twenty-five yards square. The outermost rock is ninety-two feet above the sea, and the innermost eighty-nine feet. The depth of water is from seven to nine fathoms close around this group, and fifteen fathoms half a mile outside, over a bottom of fine dark-gray sand. Inside of the rocks the depth decreases gradually to three fathoms at the edge of the shore rocks; the bottom is coarse black sand and rock.

The outer two of a second cluster of four low rocks, each about thirty-five yards in extent but covering a triangular area of five hundred yards, lie five-sixths of a mile south twenty-two degrees east (S. 22° E.) from the inner one of the Sisters, and nearly five-sixths of a mile from shore. Around and between these rocks the depth of water is nine to twelve fathoms over a bottom of sand and rock. Half a mile outside of them the depth of water is seventeen fathoms over dark-gray sand. Inside of them the depth decreases from nine to three fathoms within one quarter of a mile of the shore; the bottom is rock, gravel, and fine gray sand.

Another rock, sixty yards in extent and sixty-five feet high, lies half a mile north twenty four degrees west (N. 24° W.) from the inner one of the Sisters, and seven hundred yards from the nearest shore; there is a depth of seven fathoms of water close around it and six to three fathoms close in shore. Half a mile outside this rock the soundings are seventeen fathoms over fine dark gray sand.

Off the Sisters the soundings increase very gradually to thirty-two fathoms at six miles, with the bottom changing from sand to yellow mud at two and a half miles, where the depth is twenty-five fathoms.

Northward of the Sisters the coast-line consists of bold, broken, rocky cliffs for three miles, and is bordered by a few large rocks, which extend only two hundred yards from the shore at the three slightly jutting points. Steep hill-slopes rise to seven hundred feet covered with chaparral, and then the forests rise to the crest-line. At nearly four miles from Crescent City Light-house these high cliffs recede and the immediate shore is a broad, sandy beach backed by an open low country with undulating surface under cultivation. The forests retreat well into the broad low country, which presents the appearance of an extensive valley, breaking the usual elevation of the coast-hills for some miles hence to the Chetko River.

The *hydrography* broad off the northern limit of the coast cliffs, which is in latitude 41° 52′, shows quite uniform depths of water and character of bottom. On a southwest by west course the three-fathom line lies three hundred yards from the shore where the low-water beach is nearly one hundred yards wide; at one mile the depth is ten fathoms over a bottom of fine gray sand; at two miles, sixteen fathoms over broken shells and fine dark-gray sand; at three miles, twenty-

two fathoms over fine gray sand; at four miles, twenty-six fathoms over dark-gray sand and blue mud; and the depth increases to thirty-two and thirty-three fathoms at seven miles from shore over a bottom of dark-gray sand and mud. These sands are brought down by the immediate coast streams.

CRESCENT CITY BAY.

Approaching this bay and anchorage from Trinidad Head it can not be made out until a vessel is well up with it, because the comparatively low Point Saint George stretches three miles to the westward of the anchorage. It is, however, recognized upon a nearer approach by the Light-house and by the houses of the town fronting the beach.

The high, bold, rocky shore from the southward decreases gradually half-way from the Klamath River and ends within three miles of Crescent City Bay, changing to a low, sandy shore with a broad, low-water beach. This low shore runs nearly northwest for two miles and then sweeps westward and southwestward to form the open and exposed roadstead. The Light-house is at the southwestern point of this curving shore. The low land on the eastern shore is partly covered with forest, and the broad, low, wooded valley running inland is a notable feature of the topography of the country. Combined with the low land hence to the northward of Point Saint George, and embracing the area of Lake Earl and the lower reaches of Smith's River, this low region is exceptional in being found projecting so well seaward.

Crescent City anchorage is the most dangerous of the larger roadsteads usually resorted to by steamers on the coast. It formerly had much importance on account of Crescent City being the depot for the supplies of miners working the gold-diggings on the Klamath, Trinity, and Salmon Rivers. It is a very contracted place, being very little more than a mile and a half in extent east and west and three-quarters of a mile north and south. But the low-water beach is very broad, and the line of three fathoms is half a mile from shore at the anchorage. It is filled with sunken rocks and reefs and has a goodly number showing above water. No navigator should think of gaining an anchorage here without a pilot unless he has a perfect knowledge of the hidden dangers. No sunken rocks are now known to exist outside of the line of visible ones except one awash southwest three quarters west (SW. ¾ W.), and a little more than half a mile from the Light-house. In the approaches from the south there is a four-fathom ledge to be described. Approaching from the southeast the line of ten fathoms, which was only half a mile off the coast abreast the Sisters, gradually increases to a mile off shore within two miles of the anchorage, but to the westward of the bay this line again comes closer to the shore and rocky islets.

There is now a fine wharf at this place, described under the head of Flat Rock.

ISLETS AND DANGERS IN THE APPROACHES AND BAY OF CRESCENT CITY.

Chase Ledge.—This is a three and one quarter fathom rocky patch lying in thirteen fathoms of water, one and three quarters miles south forty degrees east (S. 40° E.) from the Light-house, on the range of the Light house and the west side of Steam boat Rock. Mussel Rock bears from it north seventeen degrees east (N. 17° E.) distant three-quarters of a mile, and Round Rock north twenty five degrees west (N. 25° W.) distant seven-eighths of a mile. The area within the ten-fathom curve is two hundred and fifty yards, and the bottom at the outer limit is sand and mud. It breaks upon this reef in heavy weather.

Mussel Rock.—This is a rock seven feet above the water and thirty yards in extent. It rises from six fathoms of water about one mile broad off the low beach to the northeast, but lies to the eastward of the usual track of vessels bound to the anchorage. The depth of water around it is quite uniform at six to seven fathoms with rocky bottom. There is a depth of seven fathoms between it and Round Rock. From it the Light-house bears north sixty-five degrees west (N. 65° W.) one and three-eighths miles distant; and Round Rock bears north eighty-five degrees west (N. 85° W.) distant nearly five-eighths of a mile.

Round Rock.—This is a rocky islet nearly fifty yards in extent and forty-five feet high. It is the leading-in islet for vessels seeking the anchorage, and there is a depth of nearly eight fathoms of water quite close around it. From it the Light-house bears north fifty-four degrees west (N. 54° W.) distant a trifle over seven-eighths of a mile. Vessels pass it on either the east or west side within one hundred and twenty yards. (See Sailing Directions.) Inside of this rocky islet the sunken rocks commence within four hundred yards.

On the *east side* of the channel to the anchorage lie the following rocks:

A *nineteen feet rock* lies three hundred and eighty yards north sixty-eight degrees east (N. 68° E.) from Round Rock. It is marked by a field of kelp. There are five and six fathoms of water near it.

A *seventeen-feet rock* lies four hundred yards north forty-eight degrees east (N. 48° E.) from Round Rock. It is surrounded by kelp, and has five fathoms of water on all sides except south-southeast.

The last two rocks are but one hundred and twenty yards apart, about north-northwest and south-southeast from each other, and are probably points of the same ledge.

A *seven-feet rock* lies six hundred and thirty yards north fifty eight degrees east (N. 58° E.) from Round Rock. The area of this patch inside the twelve-feet curve is one hundred yards. It is on the east side of the channel to the anchorage and has four and five fathoms close around. There is kelp on the northwest side of it.

For half the distance between this seven-feet patch and Whaler Island there are four fathoms of water, to the edge of a two-feet rock, whence the bottom is very foul to Whaler Island.

A second *seven-feet rock* lies six hundred yards north twenty degrees east (N. 20° E.) from Round Rock. There is deep water, from four to five fathoms, around it, and kelp to the eastward.

A *two-feet rock* lies seven hundred and fifty yards north seven degrees east (N. 7° E.) from Round Rock, and only two hundred and twenty yards east from the Fauntleroy Rock. It has four fathoms of water close to it.

On the *west side* of the channel to the anchorage lie the following rocks and ledges:

A *fourteen-feet ledge* lies six hundred yards north twenty-eight degrees west (N. 28° W.) from Round Rock, and only two hundred and fifty yards southwest by south (SW. by S.) from the Fauntleroy Rock. There is kelp on this rocky ledge.

A *nine-feet ledge* lies fifty yards nearer Steam-boat Rock and is part of the above fourteen feet ledge. It is six hundred and seventy yards north thirty-three degrees west (N. 33° W.) from Round Rock. There are over four fathoms of water immediately to the southward of it.

A *thirteen-feet rock*, surrounded by kelp, lies three eighths of a mile from Round Rock on a direct line to the Light-house (north fifty four degrees west from Round Rock). This is also part of the fourteen feet and nine feet ledges last described.

The entire area between the three last described rocks, Steam-boat Rock, and the Light-house Islet is full of sunken and visible rocks which it is impracticable to describe in detail; and there are other sunken rocks to the westward of Steam boat Rock which will be found described further on.

Fauntleroy Rock.—This is the principal hidden danger in approaching the anchorage, as it lies squarely in the passage leading to it in the narrowest part between the sunken rocks on the east and west sides. It is one of the hidden dangers because it is covered at three-quarters flood-tide, yet at nearly all times there is a breaker about it. There is a depth of four fathoms of water all around it, and the passage-way to the anchorage is close on either side of it. The eastern side, however, is preferred, as the rock is bold on that side; it is reported to slope some to the westward. It was at one time marked by an iron spindle, but this was destroyed in 1885, so that only a foot of it remains (1886), and this adds to the danger of the rock.

Fauntleroy Rock Buoy.—On the 20th of May, 1889, a *black spar* buoy was placed close to Fauntleroy Rock, in place of the red and black spar buoy carried away in January, 1889.

Fauntleroy Rock lies north twelve and a half degrees west (N. 12½° W.), distant three-quarters of a mile from Round Rock, and from it we have the following bearings and distances: Steam-boat Rock bears south seventy-seven degrees west (S. 77° W.), distant nearly half a mile; the Light-house bears north seventy-six degrees west (N. 76° W.), distant five-eighths of a mile; the northwest point of Whaler Island bears north forty one degrees east (N. 41° E.), distant one-quarter of a mile; and the anchorage bears north northwest (NNW.), distant one-quarter of a mile, which latter bearing is nearly the direction to the saw-mill at the east side of Elk Creek.

There is foul ground quite close to the Fauntleroy Rock, as follows: the *fourteen-feet ledge* already described, with kelp on the north side, bears southeast by south (SE. by S.), distant two hundred and forty yards; the *two-feet sunken rock*, already described, two hundred and fifty yards to the east; and *a twelve-feet ledge* with kelp two hundred yards to the westward (WNW.).

Whaler Island.—This is a large, rocky islet two hundred yards in extent and seventy-seven feet high. It lies just within the three-fathom line, and forms the eastern side of the clear area inside of the Fauntleroy Rock where the steamers and sailing vessels anchor. When projected on the low lands of the shore behind it, it stands out in good relief in clear weather, and is a good mark for vessels coming up the coast. There is an extensive reef stretching out from its eastern shore and also to the northward. On the southern side there is foul ground in spots for nearly one-third of a mile, whilst the western face has nearly three fathoms of water close to it. The western point of Whaler Island bears north nine degrees east (N. 9° E.), distant a little more than half a mile from Round Rock, and north eighty-eight degrees east (N. 88° E.), distant four-fifths of a mile from the Light-house.

Steam-boat Rock.—This is a rocky islet eighty yards in extent and fifty-four feet high, nearly surrounded with foul ground. It lies north sixty-one degrees west (N. 61° W.), distant a little more than half a mile from Round Rock, and south forty-four degrees east (S. 44° E.), distant one-third of a mile from the Light-house. For more than half-way from this rock to Whaler Island the ground is very foul, but beyond that, towards Whaler Island, the depth of water is four and a quarter fathoms in the anchorage.

In addition to the sunken rocks already described as dangers in the immediate passage to the anchorage, the following sunken rocks and rocks awash lie to the westward of Steam-boat Rock.

A second *thirteen-feet rock* lies five-eighths of a mile west one-quarter north (W. ¼ N.) from Round Rock, and five hundred and fifty yards south twenty-seven degrees west (S. 27° W.) from Steam-boat Rock. It is on the range of the south side of Round Rock and the south side of Mussel Rock. It has eight to ten fathoms all around it, but an eighteen-feet rock lies one hundred and sixty yards to the west of it. There is no kelp to mark this rock.

An *eighteen-feet rock*, referred to in the preceding description, lies nearly three-quarters of a mile west one-quarter north (W. ¼ N.) from Round Rock, and six hundred and twenty yards south forty degrees west (S. 40° W.) from Steam-boat Rock. It lies on the range of the south side of Round Rock and the north side of Mussel Rock. It has nine and ten fathoms of water around it, with the thirteen-feet rock one hundred and sixty yards to the east of it. No kelp marks this rock.

From this eighteen-feet rock the Light-house bears north one-third west (N. ⅓ W.) distant just half a mile.

A *sunken rock* with six feet of water upon it and six fathoms of water around it lies very nearly one-quarter of a mile south sixty-three degrees west (S. 63° W.) from Steam-boat Rock, and one-third of a mile south seven degrees east (S. 7° E.) from the Light-house. It is just north of the range of the south sides of Steam-boat Rock and Whaler Island. One hundred and fifty yards inside of it the ground is very foul.

A *rock awash* lies in nine fathoms of water on the ranges of the middle of Steam-boat Rock on the south side of Whaler Island, and the south side of Round Rock on with the north side of Mussel Rock. From it the Light-house bears northeast by north (NE. by N.), distant nearly five-eighths of a mile; Round Rock bears east one-quarter south (E. ¼ S.), distant exactly one mile; and White or Bird Rock west by north half north (W. by N. ½ N.), distant very nearly one mile.

It is reported that at extreme low tides two whirls are seen a short distance outside this rock awash; but this report may refer to the thirteen and eighteen feet sunken rocks, just described, lying over a quarter of a mile southwest from Steam-boat Rock.

Farther to the northwest there are no known hidden dangers outside the lines connecting the outermost visible rocks hence to Point Saint George.

Flat Rock and the Wharf.—Flat Rock is a low rock, sixty yards in extent, lying on the twelve-feet line in the harbor of Crescent City, three hundred and fifty yards off the east side of Battery Point. It is directly north of Steam-boat Rock, distant three-eighths of a mile, and one-quarter of a mile east-northeast (ENE.) from the Light-house.

A high and well constructed wharf has been built out from the northeast shore of Battery Point for five hundred yards over the reef and out as far as Flat Rock, where it was anchored to the rock in a very substantial manner. But the gales of November, 1885, proved the heaviest that have been felt at Crescent City since 1853, and the wharf was carried away. Another wharf, running parallel with the former, has been built out from the shore three hundred feet further to the eastward. The old wharf has not been repaired.

SAILING DIRECTIONS.

Ship-masters trading regularly to Crescent City rarely run by bearings when they have reached the vicinity of Round Rock, but govern their courses by the breaks and swirls on the sunken rocks, and by the patches of kelp. Strangers should proceed very cautiously, and for the benefit of such the following directions are given:

When approaching the anchorage from the southward run for Round Rock, the outermost rocky islet already described; pass it on the port hand in six fathoms of water over rocky bottom, giving it a berth of about one hundred yards, and steer north by west one quarter west (N. by W. ¼ W.) for three-eighths of a mile to about one hundred yards east of Fauntleroy Rock and that rock in range with Steam-boat Rock. In this position the two-feet sunken rock lies one hundred and ten yards to the east-southeast; it may show a swirl on it, but do not depend on that. From this position steer northwest (NW.) for one quarter of a mile and anchor in three and a quarter fathoms of water on the line between the Light-house and north side of Whaler Island and on the line of the wharf.

Another course to the anchorage, more suitable for sailing vessels in the ordinary northwest winds, is to pass Round Rock on the starboard hand at the distance of about one hundred yards; steer north three-quarters west (N. ¾ W.) for half a mile, passing the *fourteen-feet* ledge, marked by kelp, close on the port hand, Fauntleroy Rock distant ninety yards on the starboard hand, and the *twelve feet* ledge, marked with kelp, distant ninety yards on the port hand. Continue this course until Whaler Island bears about east, then haul your wind closely and shoot up to the anchorage in three fathoms as before directed. Should it be necessary to tack ship after passing the Fauntleroy Rock, act promptly and remember that the west side of Whaler Island can be approached moderately close, carrying three fathoms with no known sunken dangers, but that, if you fetch in to windward of Whaler Island, you must tack again when or before its western end bears southeast (SE.). The sunken rocks on the weather side of the passage are marked by kelp and may be approached as close as the wind will permit.

To a ship-master accustomed to observe and run by ranges the following direction will be useful. When approaching the anchorage, and as soon as Round Rock can be made out, bring it to bear north half west (N. ½ W.). Note some object on the low shore on the northeast side of the anchorage, and also some tree or other object farther inland, both in range with Round Rock on that bearing. Steer on that range, which will also clear Chase's Ledge, directly for Round Rock, and when nearly up to it port your helm to clear it close aboard on the port hand; resume the range again as soon as you are past Round Rock, and run in on the range, passing midway between Fauntleroy Rock and the two-feet sunken rock, until the Fauntleroy Rock is in range with Steam-boat Rock; then proceed to the anchorage as before directed.

Coming from the northwest, ship-masters acquainted with the channel between the reefs off Point Saint George keep half a mile outside of Castle Rock, White Rock, and the rock awash, which lies half a mile outside Steam boat Rock. A vessel half a mile south of White Rock may safely steer for Round Rock, and when within half a mile of it, pass to the westward of it at a distance of a quarter of a mile, then steer for Whaler Island until Round Rock bears south half east (S. ½ E.) and run in on the east side of the Fauntleroy Rock as before directed.

Vessels generally anchor in three to three and a quarter fathoms of water on the line between the end of the wharf over Flat Rock and the south side of Whaler Island, or on the line of the Light-house and north side of Whaler Island. The anchorage is safe only during the six or seven months of the "dry season," when the wind blows with great regularity from the west northwest and northwest. The lines of the sand dunes at Point Saint George and to the northward of it practically prove this direction; but it is said that very frequently the wind at the anchorage will draw in over the beach to the north and northeast. During the summer the fogs are very dense in this section, and it seems wonderful how the coasting steamers manage to get in and out with so few aids to navigation. There is no fog-whistle at the Light-house, but when the saw-mill is running it gives answering blasts to the whistle of any approaching steamer.

Whistling Buoy.—On the 20th of May, 1889, a *whistling buoy* was placed in the approach to Crescent City Bay. It is moored in ten and one-fourth fathoms of water over hard sand and rocky bottom. It is located by the following ranges, bearings, and distances: Round Rock in the center of Whaler Island in range, bearing north fourteen and a half degrees east (N. 14½ E.), and Round Rock distant one-third of a mile; Light-house a little open to the west of Steam-boat

Mountain behind Cape Ferrelo, 25 miles.
NW. Seal Rock, NW., 8½ miles.
Point St. George, N. by W., 6 miles.
Town. Whaler Island.
Crescent City Light-house, N. by E. ½ E., 5 miles.

NW. Seal Rock (St. George Reef Light-house site), S. 10° E., 8 miles.
Crescent City Reef (all the back country in smoke).
200 feet.
SW. Seal Rock, 45 feet, 10 miles.
Castle Rock, 208 feet, S. 14° E., distant 15 miles.

Mack's Arch, NW. by N., 7 miles.

Rock, the former bearing north fifty-two degrees west (N. 52° W.), distant one and one-sixteenth miles, and Steam-boat Rock, distant eleven-sixteenths of a mile.

CRESCENT CITY LIGHT-HOUSE.

Crescent City Light-house is located on a rocky islet, about forty-five feet above the sea, lying close under Battery Point and connected with it at low tide. The building consists of a keeper's dwelling of stone, painted light buff, and one and a half stories high, with a low tower of brick, plastered and whitewashed, rising through the center and surmounted by an iron lantern. The dome of the lantern and the balustrade are painted red. The height of the structure from base to focal plane is thirty-five feet. The Light is a harbor light of the fourth order of Fresnel and shows from sunset to sunrise a *fixed white light, varied by flashes.* The interval of the flashes is ninety seconds. In July, 1871, we made observations upon the Light from a near station to establish its phases, which were as follows: Moderately bright, sixty-one seconds; dark, twelve and a half seconds; bright flash of less than one second; dark, twelve and a half seconds; moderately bright, as before. Other measures have made the bright flash as much as three seconds.

The Light was first exhibited on the 10th of December, 1856. In April, 1860, it was not shown for a short time.

It illuminates two hundred and seventy degrees of the horizon. The compass range of visibility, useful to mariners, is from northeast half east (NE. ½ E.) round by east, south, and west to west by north half north (W. by N. ½ N.). The focal plane is eighty feet above high water level, and the Light should be seen in a favorable state of the atmosphere from a height of—

10 feet at a distance of 13.9 miles.
20 feet at a distance of 15.4 miles.
30 feet at a distance of 16.5 miles.

The geographical position of the Light, as determined by the Coast and Geodetic Survey, is:

Latitude	41° 44′ 37″ north.
Longitude	124° 12′ 06″ west.
Or, in time	8h 16m 48s.4.

The magnetic variation was 18° 55′ east in January, 1885, with a yearly increase of 1′.1.

From the Light-house we have the following bearings and distances to important objects:

Cape Mendocino Light-house	S. 10° E., distant 79 miles.
Whistling Buoy off Humboldt Bar	S. 17° E., distant 59 miles.
Rocky Point	S. 21° E., distant 37 miles.
Redding Rock	S. 22° E., distant 25 miles.
Jonathan Rock (sunken) Saint George's Reef	N. 88° W., distant 6¾ miles.
Northwest Seal Rock (proposed light) Saint George's Reef	N. 75° W., distant 9¾ miles

The secondary astronomical station of the Coast Survey was on the extremity of Battery Point just inside the Light-house. It is in latitude 41° 44′ 47″ north, longitude 124° 11′ 58″ west.

Tides at Crescent City.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XI^h 33^m. The mean rise and fall of the tides is approximately four and seven-tenths feet. The average difference in height between the morning and afternoon tides of the same day is one and four-tenths feet for the high waters, and two and three-tenths feet for the low waters. When the moon's declination is greatest, these differences are respectively two and two-tenths feet and three and six tenths feet. The highest high tide in the twenty four hours occurs about 11^h 06^m after the moon's upper transit when the moon's declination is north; and about 1^h 19^m before the moon's transit when her declination is south. The lowest low water occurs about seven hours after the highest high water, the tides being of the same type as those more fully described for San Francisco.

To obtain the time and height of each tide of the year take out for the required date the times and heights for Astoria, Oregon, from the published tide tables for the Pacific coast; then for the time of high water of Crescent City subtract 1^h 12^m from the time of high water at Astoria, and for the height subtract one and six-tenths of a foot; for the time of low water subtract 1^h 25^m for the time of low water at Crescent City, and for the height add one-tenth of a foot.

Crescent City Bay was first surveyed in 1853, and again in 1859. The following report (1859) will show clearly the dangerous character of the roadstead, and the knowledge required to enter it:

During the progress of the resurvey of Crescent City Harbor, we found several new, dangerous rocks; but as they are not in the channels followed by steamers, and do not interfere with the anchorage in use, it does not seem neces-

sary to notice them further in advance of the publication of the chart, as every one trading here knows that v drawing over nine feet should be very cautious in venturing out of the beaten track. The rocks at that place a peculiar character, standing isolated like bayonets, with their points just below the surface, and ready to pier unlucky craft that may encounter them. After we finished the survey, and a fair way had been selected for a s line, we discovered a very sharp rock almost directly in the passage, with its point only three feet from the s and deep water all around it. This is mentioned to show that, although the greatest care was taken in the s the character of the points of rocks is such that it can not be surprising if new ones be found for several seasons to

Communication is maintained during the spring, summer, and autumn with San Francisco and other ports by coasting steamers and sailing vessels; during the winter a steamer m regular trips.

The town lies northwest of the anchorage and has become a place of importance. There are six hundred to seven hundred inhabitants, and about two thousand in the county. Much of the adjacent country is cultivated, and an immense amount of stock is raised.

Southeastward from the town commence the detached deposits of auriferous sand and gravel which are found hence northward to the Coquille River. These sands were formerly worked near Crescent City, but this industry is now abandoned.

In 1775, Bodega, the commander of the schooner *Felicidad* or *Sonora*, made the land in latitude 41° 50′ on the 8th of June when returning from the northward. In 41° 40′ he took possession of the country and gave to it the name El Puerto de los Remedios. He says the harbor is guarded from winds of the fourth, first, and part of the second and third quadrants by the very high hills [por muy altos montes] which surround it. Although he mentions high rocky islets close under the shore in 42° 36′ he does not refer to the dangers of the Dragon Rocks or Crescent City Reef.

In the voyage of the *Sutil* and *Mexicana*, in 1792, Point Saint George is fairly well laid down, the reef and dangers represented, and indentations to indicate the streams entering at and about the location of Crescent City.

Tebenkoff calls Crescent City Harbor the "Bay of San Sebastian."

A chart of Crescent City Harbor was published in 1859; and in 1875 a chart embracing harbor and the Dragon Reef to the west-northwest.

The Davidson Inshore Eddy Current (north of latitude 42°).—Some of the most satisfactory proofs of the movement of this current north of Crescent City have been established during the last two or three years. In that time topographical reconnaissances were made from Cape Sebastian to Port Orford, from Cape Orford to the Yaquina River, thence to Tillamook Bay, and from Gray's Harbor to Cape Flattery. It is a fact well known to botanists and to lumbermen that the growth of the California redwood ceases just north of the California boundary line, and probably between Capes Ferrelo and Sebastian; and there are no saw-mills cutting the timber except to the southward. On the above reconnaissances the redwood logs and trunks of redwood trees were found along the whole of the northern shores, and were well known to Indians and settlers. Redwood logs and trees had already been found on the beaches between Tillamook and the Columbia River. The shore from Gray's Harbor to Cape Flattery was marked by redwood logs well known to the Indians. It was wanting to trace the logs along the western shore of Vancouver Island. This was done during the year 1888, and they were found as far north as Cape Scott, in latitude 50° 46′, and their properties are well known to all the Indian tribes. In the same year driftwood logs were found on the Chim-se-an Peninsula and Wales Island, Alaska, between 54° 10′ and 54° 40′, having drifted not less than eight hundred miles to the northward.

The movement of wrecked vessels to the northwestward along and past the shores of Vancouver Island is well illustrated by the drift of the bark *Maria J. Smith* for two hundred and miles; and the drift of part of the wreck of the *St. Stephen*, that foundered off Flattery Rock 1886, and was cast ashore about latitude 50°. Six Columbia River buoys lie between Bonilla and Cape Cook. Many other proofs have been gathered, but need not be enumerated. Only one need be mentioned to indicate the velocity of this eddy current: to the westward Point Bonilla was found a Columbia River seine, with the name of the cannery attached, and the fish still hanging in the meshes. It must have been carried one hundred and fifty miles in days.

POINT SAINT GEORGE.

For three and one-third miles to the west-northwest from Crescent City Light-house the and forbidding coast-line stretches to form Point Saint George. The shore-line is moderate but rocky, and bordered by reefs and foul ground out to the line of rocky islets which lie of

a distance of three-quarters of a mile. Off the westernmost part of the point the dangers are not quite so far out, reaching only half a mile to the west-northwest; but the great Saint George's Reef or Dragon Rocks begin at one and a half miles from the point and stretch out for five miles to the west-northwest. Between the inner end of this reef and the dangers immediately under the point is the Saint George's Channel, which is a little over three-quarters of a mile wide within the eight-fathom lines and carries from nine and a quarter to fourteen and a half fathoms of water over variable bottom, rocky, fine green sand, broken shells, coarse gravel, yellow mud, and sand.

The point itself is quite low, with several irregular and rocky hillocks on the immediate shore-line, reaching one hundred and fifty-six feet in height, and several high, rocky islets close under it, and one lying two-thirds of a mile off shore to the southward. The point is nearly one mile in extent northwest and southeast, with sand dunes and low land immediately behind it, and the forest trees about five-eighths of a mile to the northeast, and with a few trees just inside the southeastern extremity. The seaward face of the one hundred and fifty-six feet cliff, named Promontory Rock, at the shore line is nearly vertical, as if the half of a round hill had been cut away.

The following are the rocks off the shore-line between Crescent City Light and Point Saint George:

Bird or White Rock.—This rock is about one hundred and twenty yards in extent, and it is reported to be about sixty feet high. As seen from seaward it generally appears of a whitish-yellow color. It lies five-eighths of a mile off the shore and one and one-quarter miles south seventy-eight degrees west (S. 78° W.) from the Light-house. There is a smaller rock about one-third of a mile to the east by south from it, with eight fathoms of water around the latter. Close under the west end of Bird Rock are three small rocks. All around this rock and for a quarter of a mile inshore the depth ranges from eight and a quarter to ten fathoms of water. The round, grassy islet close inshore abreast of Bird Rock is Preston's Island, and a quarter of a mile from the west end of Bird Rock towards Preston's Island there is a sunken rock with twelve feet of water upon it and six and a half fathoms of water inside of it. Vessels may pass close under the seaward side of Bird Rock when running for or leaving Crescent City Bay.

Castle Rock.—This is a large rocky islet one-quarter of a mile in length northeast and southwest, but irregular in outline. The summit near the southwest end is two hundred and eight feet above the water. It lies three quarters of a mile off the shore, two and one-third miles north eighty four degrees west (N. 84° W.) from the Light house and one and a half miles south thirty degrees east (S. 30° E.) from the northern part of Point Saint George. There is no deep water inside of it, but a broad area of visible and sunken rocks with patches of kelp reaching northeastward to the shore. For one-third of a mile southeastward on and inside the line to Bird Rock there are several visible and sunken rocks, and thence a line of visible rocks towards Preston's Island. But immediately under the southeast side of Castle Rock, and on the south, west, and northwest faces, the depth of water is nine to ten fathoms over hard sand and rocky bottom.

This rocky islet is a good mark for vessels passing through the Saint George's Channel either from the northwest or southeast, and they may pass quite close to it.

Point Islet, only one-quarter of a mile off the southern part of Point Saint George, is a rocky islet two hundred yards in length east and west, and rising by a gradual slope from the east to two hundred feet at the west, where it drops off almost vertically. It lies near the limit of the nine fathom line stretching from the point, and has less than two fathoms of water close under its southwest angle; but within sixty yards outside of this there is a depth of five to six fathoms of water, with gradual increase to nine fathoms in a quarter of a mile. Two *sunken rocks* close together lie two hundred and fifty yards south-southwest (SSW.) from this southwest angle of the islet, however, and just outside of the line from the western extremity of Castle Rock to Brown Rock (half a mile west-northwest from Point Saint George).

Point Islet lies two and three-quarters miles north seventy-five degrees west (N. 75° W.) from the Light-house and on the line and nearly midway between Castle Rock and the northwest part of Point Saint George. It is a good mark for going through the channel.

Promontory Rock.—This is a high rocky islet connected with the shore at low water. The base of it is only one hundred and twenty-five yards long, but it rises to one hundred and fifty-six feet above the sea, and with its white front is a notable object. Foul ground stretches one-fifth of a mile outside of it to three fathoms. It lies three-eighths of a mile from the northern extremity of Point Saint George, and five-eighths of a mile from its southeast limit.

Arch or White Rock.—This is quite a small rock, about forty yards in extent and forty-five feet high, and lies one-quarter of a mile west of the northern part of Point Saint George. It is embraced within the limit of the three-fathom curve, which also includes two smaller rocks four hundred yards to the southward. Inside of these rocks, and inside the three-fathom line, are numerous small rocks and very foul ground.

When seen from the east and west White Rock shows an arch, and hence this name is sometimes given to it.

Brown Rock.—This is a small, high rock, very near the outer end of the reef which stretches west-northwest from the northernmost part of Point Saint George. The rock is fifty-one feet in height and half a mile from shore. The tail of the reef stretches two hundred yards to the southwest of the rock, and thereby decreases the width of the reef channel, which is narrowest at this place.

Brown Rock lies one and three-quarters miles north thirty-seven degrees west (N. 37° W.) from the western end of Castle Rock, but the line joining them is foul at the end of the reef running south from Arch or White Rock, and by the sunken rocks outside of Point Islet.

The trigonometrical station Point Saint George of the U. S. Coast and Geodetic Survey is located on the summit of Promontory Rock. Its geographical position is:

Latitude	41° 46′ 39.0″ north.
Longitude	124° 15′ 28.8″ west.
Or, in time	8h 17m 01s.9.

Point Saint George was named by Vancouver in 1792 and his name has continued. In the chart of the voyage of the *Sutil* and *Mexicana* of the same year it is designated El Cabo de San Sebastian.

THE DRAGON ROCKS OR SAINT GEORGE'S REEF.

This dangerous reef lies off Point Saint George. It is inside the usual course of the steamers running directly from San Francisco to the Columbia River and the Strait of Fuca; but it is on the track of the coasting steamers and vessels plying between San Francisco and the nearer northern ports. It comprises nine visible rocks, ranging from five to sixty-four feet in height, and not less than nine sunken reefs. The extreme outer rock is that known as the Northwest Seal Rock, formerly fifty-four feet above the sea and situated six and three-eighths miles north seventy-six degrees west (N. 76° W.) from Promontory Rock in the face of Point Saint George, or nine and three eighths miles north seventy-four degrees west (N. 74° W.) from the Crescent City Light-house. But the greater area of the reef lies to the southward of these lines, and in two unequal fields; the inner field compact and very foul, within limits of two and a quarter by one and a half miles; the outer field open, between the Northwest Seal Rock and the Jonaton Rock, three miles long and less than a mile broad. On account of these two fields there are two channels through the reef: the Saint George's Channel between Point Saint George on the east and the inner field of rocks on the west, and the Dragon Channel between the inner or middle field of rocks on the east and the outer line of rocks on the west. A detailed description of the visible and sunken rocks constituting the two groups of the reef will be given after the description of the channels.

The Saint George's Channel is a little over three-quarters of a mile wide within the eight fathom limits, and carries from nine to fourteen and a half fathoms of water over a very variable bottom of sand, gravel, shells, mud, and rock. Its eastern limit lies along the west face of Castle Rock, and thence northwest one and three-quarters miles to the tail of the reef outside of Brown Rock. The western limit is along the eastern edge of the inner or middle field of rocks, with Star Rock at the southwest point of the channel entrance, thence north seven eighths of a mile across the reported eight feet rock at one third of a mile, and the reported five-feet rock (the latter a little east of Brown Rock) at seven eighths of a mile; then northwest by north for one and one-third miles, passing Long Rock and reef, to the low, dangerous East Rock and reef forming the northeast point of the channel entrance.

The best fair-way course through this channel is northwest by north (NW. by N.) from a position three-quarters of a mile south-southwest from Castle Rock when Bird Rock is in range with the Light-house and the northern extremity of Point Saint George bears north by west (N. by W.). Run on that course until East Rock is abeam at three and three-quarters miles from the starting point, or until the Northwest Seal Rock is abeam at six and one-quarter miles from the same point.

The shoalest water on this line is nine and one-quarter fathoms when Brown Rock is almost abeam. To run to the southward through this channel bring the Northwest Seal Rock to bear southwest by west (SW. by W.) and Brown Rock, Point Islet, and Castle Rock almost in line, bearing southeast half south (SE. ½ S.), and showing just clear of Point Saint George. From this position run the opposite course, or southeast by south (SE. by S.) to the former point of departure. If the weather is thick the channel should not be used; but if objects are visible at one mile distance the breakers or the dangers on either side of the channel can be seen. At such times endeavor to make Castle Rock and keep it and the other visible rocks on the east side of the channel about half a mile on the starboard beam in passing them to the northwestward, and when Brown Rock is abeam steer northwest by north (NW. by N.) until well clear of the reef.

This channel makes a short cut of only two or three miles for a steamer coming up the coast, but it is of great advantage during the prevalence of heavy northwest winds and swell, especially as a vessel can keep well under Capes Ferrelo and Sebastian.

The Dragon Channel lies between the outer line of visible rocks and sunken dangers formed by the Northwest and Southwest Seal Rocks, the Great Break, the Mansfield Break, and the Jonathan Rock on the western side; and the large middle area of visible rocks and dangers bounded by East Rock and reef on the north, Whale Rock on the west, and Star Rock on the south. Between Whale Rock, on the east side of this channel, and Jonathan Rock and the Great Break, both sunken rocks, on the west side, the channel is one and one-fifth miles wide and the whole length less than two miles. From the position where the northern edge of Bird Rock is in range with the Light-house, and Star Rock and Brown Rock are in range, bearing northeast two thirds north (NE. ⅔ N.), the fair-way course through the channel is north-northwest (NNW.), and this course may be continued until the Northwest Seal Rock is abeam, at four and three-quarters miles from the starting point. The least water on this line is ten fathoms when the Southwest Seal Rock is abeam.

This channel is here described but not recommended, and a ship-master can hardly be justified in using it unless the weather is clear and the swell sufficient to cause breaks on all the dangers. At the best very little can be gained by it.

The visible and sunken dangers constituting the Saint George's Reef or Dragon Rocks are as follows:

The Outer Reef—The *Northwest Seal Rock*.—This is the outermost of the dangers of the Saint George's Reef, and lies nine and three-eighths miles north seventy-four degrees west (N. 74° W.) from the Crescent City Light-house, and six and three-eighths miles north seventy-six degrees west (N. 76° W.) from Promontory Rock on Point Saint George. It is one hundred and seven yards long east and west, by seventy-eight yards north and south, and was fifty-four feet high. Upon this rock the Saint George's Reef Light-house is now being built which will be described further on.

Close off the southwest point of the rock there is a small black rock nineteen feet above the water. All around and close to these rocks the depth of water reaches twenty fathoms, and within half a mile thirty fathoms over gravel and fine dark sand.

From the Northwest Seal Rock the Southwest Seal Rock bears south fifty-six degrees east (S. 56° E.), distant one and three-quarters miles, with deep water, from twenty-seven to eighteen fathoms, between them. In clear, fine weather the steamers sometimes go inside this rock.

The Southwest Seal Rock.—This rock lies seven and three quarters miles north seventy-eight degrees west (N. 78° W.) from Crescent City Light-house, four and three-quarters miles north eighty-three degrees west (N. 83° W.) from Promontory Rock, and one and three-quarters miles south fifty six degrees east (S. 56° E.) from the Northwest Seal Rock. It is about one hundred and sixty yards in extent and forty-five feet above the sea. It presents a brown and yellowish appearance, and as seen from the vicinity of the Jonathan Rock, is rather flat on top with two slight points at the apparent east end. The rock has deep water around it except under the southwest side, where heavy breaks are seen at low water about one hundred to one hundred and twenty-five yards from the rock. It is reported that there is a ledge three hundred yards farther off than the above breaks and on the same line from the rock.

From this rock Whale Rock on the east side of the Dragon Channel bears south seventy degrees east (S. 70° E.) distant one and seven-eighths miles; the "Great Break," on the west side of the same channel, south fifty-two degrees east (S. 52° E.) distant half a mile; the Mansfield Break south nine degrees west (S. 9° W.) distant a little over three-quarters of a mile; and the Jonathan Rock south twenty-nine degrees east (S. 29° E.) distant one and a half miles.

The bottom around this rock is irregular, ranging from nine to thirty-four fathoms in half a mile. Deep soundings are, therefore, no indication of safe distance from these dangers.

The "Great Break."—This is an extensive break of one hundred and fifty yards half a mile south fifty-two degrees east (S. 52° E.) from the Southwest Seal Rock. It has twelve fathoms close around it. It lies on the west side of the Dragon Channel.

The Mansfield Break.—This break has an extent of over one hundred yards. It lies half a mile south nine degrees west (S. 9° W.) from the Southwest Seal Rock. There is a depth of twenty fathoms close around it and over thirty fathoms within one-fifth of a mile on the north, west, and south.

The Jonathan Rock.—This is a very treacherous sunken rock, because it breaks only in a very large swell, and then not continuously. It lies one and a half miles south twenty-nine degrees east (S. 29° E.) from the Southwest Seal Rock and six and seven-eighths miles north eighty-seven degrees west (N. 87° W.) from the Crescent City Light-house, which will be open to the southward of Castle Rock about one-third the width of the latter. From the Northwest Seal Rock it bears south forty-four degrees east (S. 44° E.) distant three and one-eighth miles. It has five to ten fathoms close around it, but at two hundred and fifty yards the depth is twenty-five to thirty fathoms of water over dark-gray sand. It is claimed that in calm weather the water in the vicinity of the rock changes suddenly from a deep blue to a light green on the reef.

It forms the southern end of the outer reef, and the southwest point of the entrance to the Dragon Channel. From this rock Whale Rock, on the east side of that channel, bears north fifty-six degrees east (N. 56° E.) distant one and one-quarter miles.

It is supposed that upon this rock the steam-ship *Brother Jonathan* was totally wrecked in the year 1867.

The Inner Reef—The Star Rock.—This rock lies at the southernmost point of the Inner Reef, and is therefore the dividing point between the Saint George's Channel on the east and the Dragon Channel on the west of this group of visible and sunken rocks. It is a sharp-pointed pyramidal rock, sixty-four feet high, with an extent of about one hundred yards north and south. It has twenty fathoms of water close around it over bottom of dark-green sand. It lies four and one-third miles north eighty-five degrees west (N. 85° W.) from Crescent City Light-house. Castle Rock is on this line two miles eastward from the Star Rock, and these two rocks form the east and west points of the southern entrance to the Saint George's Channel. On account of its distance from the Light-house it is locally called the Four-mile Rock. From it the Promontory Rock bears north sixty-four degrees east (N. 64° E.) distant one and three-quarters miles, and Brown Rock, at the northeast point of the channel, north thirty-eight degrees east (N. 38° E.) distant one and a half miles.

Star Rock lies very nearly on the line of Hump Rock, Whale Rock, Southwest and Northwest Seal Rocks, on a general north sixty-three degrees west (N. 63° W.) course.

Danger.—It is reported that in the deep water north of Star Rock, at six hundred yards north (N.) from it, lies a sunken rock with six to eight feet of water upon it. The rock is said to have a steep face to the northeast and a slope to the southwest. A depth of eight fathoms is laid down in this spot on the chart.

Hump or Humpback Rock.—This is a small rock, twenty-two feet high, lying near the south point of the Inner Reef. It is on the line of the Northwest and Southwest Seal Rocks, Whale Rock, and Star Rock, and lies five-eighths of a mile north sixty-five degrees west (N. 65° W.) from the latter. There is deep water close around it—ten fathoms on the north and seventeen to twenty fathoms on the other sides; the bottom is broken shells and gray sand. It lies four and seven-eighths miles north eighty-two degrees west (N. 82° W.) from Crescent City Light-house, the line passing over the eastern part of Castle Rock; and from Promontory Rock it bears south seventy-seven degrees west (S. 77° W.) distant two and one-eighth miles.

Danger.—A sunken rock, bare at extreme low tide, is reported three-eighths of a mile north by east one-third east (N. by E. ⅓ E.) from Hump Rock. The exact position has not been determined, but as it is towards the middle of the Inner Reef no vessel will be there except in some great emergency. There is a depth of eighteen fathoms all around this assigned position.

Whale Rock.—This is the middle one of the line of visible rocks from the Northwest Seal Rock to Star Rock. It is the extreme western rock of the Inner Reef, and therefore is on the eastern side of the Dragon Channel. The rock is about fifty yards in extent and eighteen feet high, the highest part being towards the southeast. The depth of water around it is ten fathoms,

with apparently a ledge of the same depth, or a little more, running across the channel to the Southwest Seal Rock. There is deep water—eleven to twelve fathoms—between this rock and Flat Rock, half a mile to the northeastward, and from ten to twenty fathoms between this rock and Hump Rock, to the southeastward.

Whale Rock lies three miles south sixty-four degrees east (S. 64° E.) from the Northwest Seal Rock, or Saint George's Reef Light-house; one and seven-eighths miles south seventy degrees east (S. 70° E.) from Southwest Seal Rock; one and five-eighths miles north sixty-eight degrees west (N. 68° W.) from Star Rock; three miles west (W.) from Promontory Rock; and five and seven-eighths miles north seventy-eight degrees west (N. 78° W.) from Crescent City Light-house.

From this rock the dangerous Jonathan Rock lies one and one-quarter miles south fifty-five degrees west (S. 55° W.). When a vessel to the southwestward has Whale Rock, Flat Rock, and Long Rock in line, and at the same time Hump Rock is on with Promontory Rock, she is only a quarter of a mile east-southeast (ESE.) of the Jonathan Rock.

The northwest line of the Inner Reef stretches from Whale Rock one and one-quarter miles north twenty-six degrees east (N. 26° E.) to the low, dangerous reef of East Rock, passing over Mussel Rock with its solitary breaker two hundred yards to the north.

Mussel Rock.—This is a slightly pyramidal rock as seen from the southwest. It is on the northwest side of the Inner Reef, nearly half-way between Whale Rock and East Rock. It rises seventeen feet above the sea and has deep water close around it. A depth of thirteen fathoms is given close under its south side, with irregular bottom farther to the southeast. Two hundred yards north by west (N. by W.) from this rock is a *solitary break*, with twelve fathoms of water less than two hundred yards farther to the northwest.

Mussel Rock lies nearly three and five-eighths miles south seventy-six degrees east (S. 76° E.) from Northwest Seal Rock (Saint George's Reef Light-house) on the line to Promontory Rock and two and three-quarters miles from the latter. It is three-quarters of a mile north twenty-four degrees east (N. 24° E.) from Whale Rock.

East Rock and *Reef.*—This is the northern point of the Inner Reef. It is a very small, low, and black rock surrounded by breakers nearly two hundred yards in extent. It is the northwest point of the entrance to the Saint George's Channel, and it is marked by a constant breaker. It lies two and five-eighths miles north sixty-six degrees west (N. 66° W.) from Promontory Rock, and three and three-quarters miles south eighty-two degrees east (S. 82° E.) from Northwest Seal Rock (Saint George's Reef Light-house). The depth of water around the rock is ten fathoms at two hundred and fifty to three hundred yards, with rocky bottom.

It is in line with Mussel Rock and Whale Rock to the southwest; and with Long Rock, Sunken Rock, and Star Rock to the south-southeast. Mussel Rock is half a mile distant and Long Rock less than half a mile.

Long Rock.—This is really two rocks close together and covering an area one hundred yards in diameter, with breakers on the southeast and west sides. They show flat-topped and rise only thirteen feet above the sea. There is foul ground to the east-northeast, where a depth of four fathoms is found two hundred yards distant, and again at four hundred yards from the rock on the same bearing.

This rock is one of those forming the western side of the Saint George's Channel, and lies less than half a mile south twenty-five degrees east (S. 25° E.) from East Rock and Reef.

A *sunken rock*, breaking only at low water, lies three hundred and fifty yards to the north-northwest of Long Rock, nearly on the line to East Rock. There is deep water around this break.

Another *sunken rock* is laid down four hundred yards southeast by east (SE. by E.) from Long Rock. There is also deep water around this danger.

Flat Rock.—This rock is inside the limits of the Inner Reef. It lies nearly midway between Long Rock and Whale Rock, and five-eighths of a mile north forty-five degrees east (N. 45° E.) from the latter. It is ten feet high, and there is deep water around it.

A *sunken rock*, visible at extreme low tides, lies on the line passing through East Rock, Long Rock, and Star Rock, and midway between the extremes. It is within the eastern limit of the Inner Reef. There is deep water over rocky bottom close around it. From Whale Rock it bears north seventy-seven degrees east (N. 77° E.) a little over a mile distant; and from Star Rock north twenty-six degrees west (N. 26° W.) one mile distant.

Another *sunken rock* is reported in the reef a quarter of a mile from the last mentioned sunken rock. This rock is said to be visible in the hollow of the large swells. The chart gives a depth

of sixteen fathoms within less than fifty yards of the assigned position, which is three-quarters of a mile north seventy-nine degrees east (N. 79° E.) from Whale Rock, and five-eighths of a mile north seventeen degrees west (N. 17° W.) from Hump Rock, or nearly one quarter of a mile on the same bearing farther from the latter rock than the reported sunken rock described under the head of Hump Rock.

A *sunken rock*, having only five feet of water upon it, is reported in the foul ground on the western side of the Saint George's Channel at its narrowest part, immediately abreast of Hump Rock, which is on the eastern side of the channel. The preliminary examination of the reef had shown an extent of one-quarter of a mile, having lumps in it with less than six and even five fathoms of water. This five-feet rock is reported in this broken ground. It lies one and five-eighths miles west (W.) of Promontory Rock on Point Saint George, and nearly seven-eighths of a mile north by east (N. by E.) from Star Rock. It lies one and one-eighth miles south sixty-nine degrees west (S. 69° W.) from Brown Rock, thus narrowing the Saint George's Channel to less than that distance. The reef with shoal water is said to be one hundred and fifty yards long; but there are lumps with less than six fathoms lying two hundred and fifty yards from it in the direction of Brown Rock.

The foregoing details describe all the known visible rocks and all the known and reported dangers in approaching Crescent City Bay and Saint George's Reef, with the channels through the same. It would be a great help to the local traffic in this section, and also to steam-ships trading to northern ports, to have a small fog-whistle at the Crescent City Light-house, or an automatic whistling-buoy placed abreast and to the westward of Chase's Ledge, as an aid to find the anchorage; and to have a buoy placed on the western side of the Saint George's Channel near the last described reported sunken rock lying one and one-eighth miles southwest by west, nearly, from Brown Rock, on the eastern side of the same channel. The Light-house now in course of construction on the Northwest Seal Rock will be furnished with a steam fog signal, and will, when completed, be all that could be desired to warn navigators of the dangerous locality on the outer reef; but the aids to safe navigation above recommended are needed now, and will be needed even when this Light-house is completed, owing to its great distance from the locality to be benefited.

SAINT GEORGE'S REEF LIGHT-HOUSE.

The Light to be placed on the Northwest Seal Rock, the outermost rock of Saint George's Reef, is to be named the Saint George's Reef Light-house. It will be a primary sea-coast Light of the first order of the system of Fresnel, and will show from sunset to sunrise *alternate red and white flashes at intervals of fifteen seconds*. The focal plane will be one hundred and fifty feet above the mean level of the sea, and the Light will illuminate the entire horizon; it should be seen, in favorable conditions of weather from a height of—

15 feet at a distance of 18.5 miles.
25 feet at a distance of 19.8 miles.
40 feet at a distance of 21.3 miles.
60 feet at a distance of 22.9 miles.

The geographical position of the rock upon which the Light-house is being erected, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	41	50′ 43″.9	north
Longitude	124	22 44″	west.
Or, in time	8ʰ	17ᵐ 30ˢ.9.	

In January, 1885, the magnetic variation was 19° 00′ east, and it increases 1′.2 yearly.

From the Northwest Seal Rock, or the Saint George's Reef Light, we have the following bearings and distances to important points:

Whistling Buoy off Cape Mendocino	S. 15	E.	83 miles.
Cape Mendocino Light-house	S. 18	E.	83 miles.
Whistling Buoy off Humboldt Bar	S. 34	E.	63½ miles.
Trinidad Head Light-house	S. 33	E.	48¼ miles.
Redding Rock	S. 35	E.	31 miles.
Crescent City Light-house	S. 75	E.	9¾ miles.
Southwest Seal Rock, Saint George's Reef	S. 57	E.	1¾ miles.
Chetko Anchorage	North		14 miles.
Cape Sebastian	N. 15	W.	16 miles.
Cape Orford Light-house	N. 27	W.	60½ miles.
Pyx Rock, outermost rock of the Orford Reef	N. 30	W.	57½ miles.

At twenty-five miles the course to Fox Rock passes only two and a half miles outside Mack's Arch; and the course to Cape Orford Light passes through Rogue River Reef.

The Landfall for Point Saint George.—When a vessel is in the latitude of Point Saint George there appears a large area of moderately low land behind that point, and also for some distance to the southward and southward. Farther inland rise the rounding and generally wooded mountains culminating in *Copper Mountain*, twenty-four hundred and fifty feet, and *McGren*, twenty-seven hundred and fifty feet above the sea. But above these, and farther inland, a great rocky range of mountains comes from the northeast and culminates about twenty-five miles east of Crescent City. This is the Siskiyou range, and the highest rocky summit thereof is *Preston Peak*, reaching seven thousand and twenty-eight feet elevation and lying twenty-eight and a half miles north sixty two degrees east (N. 62° E.) from Point Saint George. It is visible at a distance of over ninety miles. It is in latitude 41° 51′ north, longitude 123° 37½′ west. Eight miles to the northward of this peak is a second sharp, rocky summit reaching five thousand eight hundred and thirty feet, which is named *Grayback*, and is visible at a distance of over eighty miles. It is in latitude 41° 58′ north, longitude 123° 32½′ west. These mountains are known to Pacific coast navigators as the *Crescent City Peaks*.

Another landfall, *Mount Toorup*, four thousand and sixty-five feet elevation and just inside the mouth of the Klamath River, has already been described.

Mount Shasta.—In July, 1886, in coming down the coast, when about latitude 41° 39′, and twenty-two miles southwest three quarters west (SW. ¾ W.) from Point Saint George, we caught two short glimpses of Mount Shasta through two low, contiguous gaps in the coast range. We judged we were looking up the valley of the Klamath River, where it breaks through to the sea, and we saw the mountain twice while the vessel moved about four miles. The bearing was east by north (E. by N.), but there may have been some local deviation of the ship's compass. It is possible that the mountain may be seen from other points to the northward of that bearing, but not to the southward. It can be seen from a vessel only when it is on the direct course between Cape Orford and Cape Mendocino and from six to ten miles off those capes. The limit of visibility of Mount Shasta falls about ten miles outside of this course when in the latitude of Point Saint George. Mount Shasta lies ninety-two miles north eighty-two degrees east (N. 82° E.) from Point Saint George. It rises to fourteen thousand four hundred and forty feet above the sea, and is visible at a distance of one hundred and thirty-eight miles. It is in latitude 41° 24′ 26″ north, longitude 122° 11′ 48″ west. It is the highest mountain in California.

It has been reported that a very distant snow peak has been seen to the southeastward through breaks in the mountains between Koos Bay and the Umpquah. If this is the case it may be possible that Mount McLaughlin (Mount Pitt) has been seen. Mount Shasta, from that latitude, would be far below the horizon, even if there were no intervening elevations to hide it. On the recent general coast charts of the Pacific coast, issued by the U. S. Coast and Geodetic Survey, all these great peaks of the Sierra Nevada and the Cascade Range have been introduced with their heights.

Magnetic Variation.—The line of magnetic variation of nineteen degrees east passed through Saint George's Reef in January, 1885, and where it reached the coast-line, in latitude 41° 53′, about six miles north of Point Saint George, it was deflected well to the northward, being apparently affected by the mass of the Siskiyou Range.

PELICAN BAY.

The Coast north of Point Saint George.—For thirteen miles northward of Point Saint George, to the boundary line of California and Oregon, the trend of the coast-line is north by west, and then it trends out to the west-northwest for eight and two-thirds miles to Cape Ferrelo, passing the mouths of Smith's River, the Winehuk, and the Chetko. Cape Ferrelo, at the end of this broken line, forms the first prominent headland northwest of Point Saint George, and it is nineteen and one-third miles north thirty-two degrees west (N. 32° W.) therefrom. This large bight, embracing the waters between Point Saint George, the Northwest Seal Rock, and Cape Ferrelo, is Pelican Bay; it is partly in California and partly in Oregon.

From the Northwest Seal Rock Cape Ferrelo bears north fourteen degrees west (N. 14° W.) about sixteen miles; this gives a total breadth of seven and a half miles to the Bay, abreast of Smith's River.

The depth of water on the line from Northwest Seal Rock to Cape Ferrelo is about thirty-five fathoms over fine gray sand and blue mud. The soundings increase quite gradually from thirty fathoms near the rock for five or six miles, and then decrease regularly to twenty fathoms one mile from Cape Ferrelo. Inside of thirty fathoms the bottom is fine, dark gray sand; at greater depths the sand is mixed with blue mud.

In the deepest part of the bight there is a depth of eight fathoms at one mile from the beach near Smith's River; twelve fathoms at two miles; eighteen fathoms at three miles; twenty fathoms at four miles; twenty-four fathoms at five miles; and twenty-nine fathoms at six miles.

There are no great bodies of kelp along the shores, but several small patches exist, principally off the Winchuk River and thence towards Chetko Anchorage.

There is always a large swell rolling on the sand beach north of Point Saint George, and the swell is usually quite large as far in as the Chetko.

The northwest winds blow directly over this bay and into the broad, low valley through which Smith's River comes, but a sailing vessel can very readily work to windward in the bay.

There are no dangers except those particularly mentioned in the descriptions of Smith's River, Winchuk River, and Chetko Anchorage. It is only abreast the receding shore at the Winchuk that any dangers extend more than a mile off shore, and these are described under their proper location.

Pelican Bay was named by La Perouse in 1787; and in 1792 Vancouver named it Saint George Bay. The present name was applied to it in the Coast Survey reconnaissance of 1850.

The shore-line northward of Point Saint George is a long straight line of sand dunes, with a broad sand beach for ten miles to Pyramid Point, forming the northern head of the mouth of Smith's River. At two and three-quarters miles the south part of Lake Talawa is reached, and the lake breaks through the sand beach during the winter freshets. Behind this lake, and connected with it, is Lake Earl, a large body of water several miles in extent. The sand dunes are from half a mile wide down to two hundred yards, and they range as high as eighty feet. Behind them the pine forests are very thick. Marsh and low ground surround both of the lakes. Through Talawa Lake there is a narrow, crooked channel carrying six to ten feet of water towards the winter opening. The strip of low sand between the ocean and Lake Talawa averages two hundred yards in width for nearly two miles, and in two or three places reaches twenty feet. From the lake to Smith's River the shore presents the same dreary appearance, relieved by the forests inside.

Smith's River.—From the Northwest Seal Rock to the north point of Smith's River entrance the bearing is north thirty degrees east (N. 30° E.) and the distance ten miles. It is ten and a quarter miles north seven degrees west (N. 7° W.) from Point Saint George, this line being parallel with the beach and nowhere over a mile therefrom. A narrow, low sand spit, over a mile in length, forms the south point of Smith's River, with low lands beyond the river. At the time of the first survey the north point was also low and sandy and one-quarter of a mile long. Where it joined the fast land to the north there are rocky cliffs, with a high pyramidal hill just north, and a high rocky islet outside. Subsequently the river opened a channel close under the north cliff. Behind the north point the land is low but gently rising for a third of a mile, and then rises rapidly, with an open, grassy, southern slope, to ten hundred and forty feet at one and one-eighth miles from the shore. This grassy slope rises to a ridge, and on the north side of the ridge are the very dense pine forests which come down to within one-third of a mile of the river.

The mouth of Smith's River was two hundred and twenty-five yards wide at the time of the original survey (1872), and it was nearly twice as wide inside, with several branches. When the hydrographic survey was made in 1874, the mouth was close under the fast land and had four feet of water in it, with deeper water in the channel for half a mile up when the channel was cut out into a broad, shoal stream.

The north point is marked by a high rocky islet, four hundred yards in extent and one hundred and eighty-seven feet above the water, lying about two hundred and fifty yards from the shore. It has a secondary head on the northwest slope. It is called *Prince Island*. The cliff, forty feet high, at the mouth of the river, lies east three-quarters south (E. ¾ S.) half a mile, from the southwest part of Prince Island. One quarter of a mile north of Prince Island lies Hunter's Rock, double-headed, one hundred and fifty yards in extent and one hundred and eighty-two feet high. Forty yards inside the point is a rocky butte, known as Pyramid, rising above the plain to an elevation of two hundred and forty feet. Half a mile north of

only one hundred and forty yards inshore and at the point of the low timber, there is another notable ragged butte rising from the low plain to one hundred and seventy feet elevation. Small visible rocks lie near the north point, but none outside of Prince Island, except a close cluster of three low rocks embraced within an area of one hundred yards and having seven feet of water all around. This cluster of rocks lies exactly south (S.) one and one-tenth miles from Prince Island, and is therefore nine tenths of a mile broad off the low beach to the eastward. One-third of a mile off the beach, and almost two miles south of the rocky cliff at the mouth of the river, there is a rock nineteen feet above the water and twenty yards in extent. It has three and a quarter fathoms of water close around it, but it shoals quickly hence to the beach.

Off the stretch of sand beach from Point Saint George to Smith's River the soundings are quite regular. The three-fathom curve is nearly one-third of a mile from the beach; at one mile there is a depth of nine fathoms over fine dark-gray sand; at two miles, fifteen fathoms over dark gray sand and rocks; at three miles, nineteen fathoms over similar bottom; at four miles, twenty two fathoms over rock and sand; and at five miles, twenty-six fathoms with bottom of fine dark gray sand.

The geographical position of the summit of Prince Island is:

Latitude	41	57′ 00″ north.
Longitude	124	13′ 07″ west.

The summit of Pyramid Butte is north seventy-one degrees east (N. 71° E.) eight hundred and sixty-six yards from Prince Island.

Smith's River rises in the northwest flank of the Siskiyou Mountains, and although the different forks are widely divergent, the general course is west.

The Smith's River of former maps and descriptions is a myth.

OREGON.

THE COAST OF OREGON.

The etymology of the name Oregon has not been satisfactorily explained. It is first mentioned by Jonathan Carver in the narrative of his trading expedition to the headwaters of the Mississippi River, between June, 1766, and October, 1768. He did not penetrate beyond the ninety-first degree of west longitude, and mentions the name but three times, in the following manner: "The River Oregon, or the River of the West, that falls into the Pacific Ocean at the Straits of Annian," "the Oregon, or the River of the West." He states that Robert Whitworth, in 1774 designed to pursue the same route traversed by himself "till having discovered the source of the Oregon, or River of the West, on the other side of the summit of the lands that divide the waters which run into the Gulf of Mexico from those that fall into the Pacific Ocean, he would have sailed down the river to the place where it is said to empty itself in the Straits of Annian." This is the extent of his information on the subject, and was derived from Indians and traders.

The boundary line between the States of California and Oregon is the parallel of 42° north latitude from the Pacific Ocean to the one hundred and twentieth meridian west from Greenwich. On the coast this parallel of latitude is just one-quarter of a mile south of the north point of the mouth of the Winchuk; and two-thirds of a mile to the northward of the parallel is the most of the inshore rocky buttes, one hundred and sixty-three feet high. The two boundary lines representing the parallel of 42°, and run at different dates, are one mile apart.

The Coast to Chetko River. From Prince Island, off Smith's River, to the north point of the Chetko River, the course is north forty-three degrees west (N. 43° W.), and the distance twelve and one-fifth miles. The coast-line recedes one and one-quarter miles to the eastward of this course.

The Chetko is fifteen and a half miles north eighteen degrees west (N. 18° W.) from Point Saint George, and fourteen miles north five degrees west (N. 5° W.) from the Northwest Seal Rock.

The short stretch of coast-line between Smith's River and the Chetko consists of low sandy cliffs, generally bordered by small rocks and marked by several outlying dangers. Immediately behind the shore the land rises very gradually for about half a mile, and is cultivated. The mesa is curiously marked by five rocky buttes which rise almost precipitously above the plain to elevations of one hundred and thirty to one hundred and seventy feet, and are useful as landmarks. Behind the narrow plains the grassy hills rise rapidly within three-quarters of a mile to twelve hundred feet, when the pine and deciduous forests begin.

At two and a half miles from Smith's River this bordering plain or mesa is broken by a jutting, grassy ridge, which comes down to the water. This ridge rises to four hundred and fifty feet in half a mile, when the pine forests begin. At three miles is the erroneously located boundary between California and Oregon.

Winchuk River.—At three and a half miles from Smith's River, the extreme point of the north eleven degrees west (N. 11° W.) from Point Saint George and twelve and one-third miles north seventeen degrees east (N. 17° E.) from Northwest Seal Rock, is the mouth of a stream called the Winchuk River, having half a mile of low sand-dunes on the south side of the mouth, and cultivated, rising ground on the north side. A short distance in, it is bordered

trees which cover the high, steep hill-sides between which it flows. The entrance to this stream was only twenty yards wide at the time of the survey, and expanded to two hundred yards inside for a quarter of a mile.

Just north of the Winchuk and one-quarter of a mile inshore is the southeastern of three noticeable rocky buttes lying in line nearly east by south.

On the short line of the coast above described, and directly off the Winchuk entrance, there are several outlying *dangers*, as follows:

Cone Rock, seventy feet high and seventy yards in extent, lies one and one-third miles north twenty-five degrees west (N. 25° W.) from the peak of Prince Island, off Smith's River. It is a little more than half a mile from the shore and has seven fathoms of water all around it; the three-fathom curve lies seven hundred yards inside of it. One hundred and fifty yards from Cone Rock, and nearly on the same bearing from Prince Island, there is a small, low rock, which has five to six fathoms of water around it.

Near Cone Rock there are *two sunken rocks*. The outer one lies four hundred yards north seventy-three degrees west (N. 73° W.) from Cone Rock and is bare at the lowest tides; it has six fathoms of water close around it. The inner rock lies five hundred yards north eight degrees west (N. 8° W.) from Cone Rock; it is also visible at the lowest tides and has seven fathoms of water close around it. There is no kelp laid down among these dangers.

Directly in the approaches to the Winchuk there are so many sunken dangers that a detailed description of them would be impracticable. The outermost only are here given, as follows:

A *sunken rock* lies north fifty-seven degrees west (N. 57° W.), distant one and one-third miles from Cone Rock, and south twenty-six degrees west (S. 26° W.), distant one and one-quarter miles, from the north point of the Winchuk entrance. This rock has twelve feet of water upon it and nine fathoms of water close around it, except to the west-southwest, where another *sunken rock* is laid down about one hundred yards distant.

This is the outermost known sunken danger, and it lies one and one-third miles from the nearest shore. It is not marked by kelp, but a small field lies half a mile inside of it in the direction of the Winchuk entrance.

A *small visible rock* lies almost three and one-third miles north forty-one degrees west (N. 41° W.) from Prince Island and one and one-third miles south sixty-two degrees west (S. 62° W.) from the north point of Winchuk entrance. It marks the outer end of foul ground stretching all the way to shore in a north by east direction, and marked by a narrow field of kelp the entire distance. Nearly a quarter of a mile inside of this rock lies another double, visible rock in the kelp, and between them, but nearer the outer one, lies a sunken rock, bare at the lowest tides.

A *sunken rock* lies almost one-quarter of a mile from the outermost of these visible rocks and directly on the line to Prince Island. It has twelve fathoms of water immediately around it, and is not marked by kelp. It lies almost a mile from the nearest shore.

Inside of these dangers is very foul ground, with visible and sunken rocks, marked by kelp in some places.

In beating up along this shore no vessel should stand in closer than one and a half miles from shore when abreast the Winchuk, or until Prince Island bears nothing to the southward of southeast (SE.).

The indications of the sand beaches south of the Winchuk, and the experience of parties hence to Mack's Arch, point to the existence of an inshore current making to the northwestward.

The Indian name, Winchuk, means women. Their name of this stream is Neh'-saw.

CHE'TKO RIVER AND ANCHORAGE.

This is in the cove in the deepest part of Pelican Bay, fifteen and a half miles north twenty-two degrees west (N. 22° W.) from Point Saint George and thirteen miles north two degrees west (N. 2° W.) from Northwest Seal Rock. It is broad open to the south. From the mouth of the river the north shore stretches one mile to the west to Chetko Point, and is an irregular, rocky bluff, eighty feet high and bordered by visible and sunken rocks, which lie out as far as five hundred yards near the anchorage. On the slope at the eastern end of this bluff and just west of the mouth of the river, sixty feet above the water and one hundred and twenty yards inside the beach, there is a large white house, which is a good landmark, and will be referred to in the following description of the anchorage and the dangers therein. It is known as Miller's House.

The east shore of the cove is a rocky cliff sixty feet high, with outlying visible and sunken rocks as far as five hundred yards from shore. Between these two lines of bluff, and in the northeast or deepest part of the cove, the shore is sand and gravel for nearly two-thirds of a mile, being the barrier at the mouth of the river. Off this beach, and directly in the anchorage, are three sunken rocks, with a fourth farther south.

The anchorage is within less than half a mile of the mouth of the river, in six and a half to eight fathoms of water over sandy bottom. The approaches at a mile distant from shore carry about eighteen fathoms of water over fine, dark-gray sand. The decrease of depth shorewards is quite regular, except towards Chetko Point, off which a deep pocket lies less than three hundred yards distant.

Chetko Point is the western point of the cove; it is a long, narrow line of ragged cliffs, sixty to eighty feet high, stretching from the grassy mesa which rises gently behind. Visible and sunken rocks run out two hundred and fifty yards from the point, and are known as the Wilson Rocks or Chetko Point Reef. From the outer end of this reef a line running east by north half north (E. by N. ½ N.), nearly parallel with the north shore, will include all the dangers lying off it. The outermost visible rock in the anchorage is called *Salmon Rock*, and it lies three quarters of a mile north sixty-six degrees east (N. 66° E.) from the outer end of Chetko Point Reef, and five-sixteenths of a mile south five degrees west (S. 5° W.) from Miller's House. It is a very small rock, with several others still smaller close to it. Two hundred and fifty yards to the northeastward from it, and directly abreast the mouth of the river, lies a larger rock named *Bar Rock*, which is used as a range mark with Miller's House to run into the anchorage.

The three *sunken dangers* already referred to as lying near the anchorage are as follows:

A *sunken rock*, with ten feet of water upon it and five fathoms around it, lies ninety yards south-southeast (SSE.) from Salmon Rock. From it the end of Chetko Point Reef bears south seventy degrees west (S. 70° W.), distant three quarters of a mile, and Miller's House bears exactly north (N.), distant three eighths of a mile.

A *sunken rock*, with fifteen feet of water upon it and five fathoms close around it, lies about two hundred yards to the eastward of the before-described rock. The top of the rock is about twelve feet long by six wide, and has thin kelp growing upon it, but this does not always reach the surface of the water. From this danger Chetko Point Reef bears south seventy degrees west (S. 70° W.), distant nearly seven-eighths of a mile; and Miller's House north eleven degrees west (N. 11° W.), distant nearly three-eighths of a mile. Miller's House is open one point to the eastward of Bar Rock.

Vessels seeking anchorage here keep the house always northerly of a north by west (N. by W.) bearing, and anchor in six and a half fathoms, with sandy bottom, when the inner or northern rock above water bears north distant three hundred and seventy yards, and the southwest rock bears northwest by north (NW. by N.), distant two hundred and thirty yards. In this position the white house is open to the west of the inner or northern rock; and the sunken rock above referred to bears northeast by north (NE. by N.), distant one hundred and seventy-five yards.

A *sunken rock* marked by a breaker lies one mile north seventy-seven degrees east (N. 77° E.) from Chetko Point Reef. It lies four hundred and fifty yards from the beach to the northeast of it, and has over five fathoms of water around it. Miller's House bears north thirty-one degrees west (N. 31° W.), distant nearly half a mile from it.

The three above-described dangers lie in the immediate vicinity of the anchorage; they are not marked with kelp except as noted. Farther to the southward lie several other sunken rocks as follows:

A *sunken rock*, marked by a breaker, lies one mile south eighty-four degrees east (S. 84° E.) from Chetko Point Reef, and seven hundred yards broad off the southern part of the beach. Miller's House bears from it north twenty-five degrees west (N. 25° W.), distant nearly three-quarters of a mile. It has seven to eight fathoms of water immediately around it, and is not marked by kelp.

Three hundred yards northeast half east (NE. ½ E.) towards the beach from this sunken rock lies another *sunken rock* with fourteen feet of water upon it and five fathoms immediately around it; it is marked by kelp. From this latter danger Miller's House bears north thirty-nine degrees west (N. 39° W.).

A *sunken rock*, with nine feet of water upon it and six fathoms immediately around it, lies three-eighths of a mile from the jutting point at the southern end of the sand beach. There is a small

of twelve fathoms within a quarter of a mile southwest from it. It is marked by kelp on the northwest side. From this rock Chetko Point Reef bears north seventy-six degrees west (N. 76° W.), distant one and a half miles; and Miller's House bears north thirty-nine degrees west (N. 39° W.), distant one and one-quarter miles. Between this rock and the shore are many other sunken rocks and dangers, with small patches of kelp.

Two other *sunken rocks* upon which the sea breaks, and hitherto unknown, lie respectively south thirty degrees east (S. 30° E.), distant three-quarters of a mile; and south thirty degrees east (S. 30° E.), distant half a mile from the white house.

Steam-vessels approaching Chetko Anchorage from the southward should keep not less than a mile off shore until Miller's House bears north by west (N. by W.), when a course can be made for it with Bar Rock in range. Do not bring the house to bear anything west of this course when within a mile of the anchorage. Anchor in seven fathoms, with Chetko Point Reef bearing west by south (W. by S.).

Vessels from the westward can round the Walrus Rocks, or Chetko Point Reef, at one-eighth of a mile in seven to nine fathoms of water, and steer east by north (E. by N.) until Miller's House bears north by west (N. by W.); then anchor.

There are no fields of kelp in this cove; some few trifling patches lie in the foul ground to the southward, as above described, out to about six fathoms; but the outermost dangers neither here nor abreast the Winchuk are marked with kelp. Great care should therefore be exercised when approaching from this direction. (See description of sunken rocks off the Winchuk.)

Off Chetko Point, in a southwest direction, the soundings are very regular. A depth of nineteen fathoms over fine, dark-gray sand is found at one mile; twenty-two fathoms over fine, dark-gray sand and rock at two miles; twenty-five fathoms at three miles; thirty-one fathoms at four miles, over fine, dark-gray sand; and thirty-eight fathoms at five miles, over fine, gray sand and blue mud.

The mouth of the Chetko River varies in width according to the volume of water; sometimes it is sixty yards wide, with a foot of water on the bar at low water. At other times it is closed altogether by the heavy gravel beach, which was the condition in which we found it in August, 1853. The river inside has a general width of two hundred yards, and comes down between banks one hundred and twenty feet high; behind the banks the hills rise to six hundred or seven hundred feet in less than half a mile. The forests come down to the river-banks in many places.

We landed directly on the north part of the gravel beach at the mouth of the river, but the best boat landing is reported to be behind the large rocky islet abreast the northernmost end of this beach.

The geographical position of the extremity of Chetko Point is:

Latitude	42	02′	34″
Longitude	124	17′	30″
Or, in time	8h	17m	10s.6

The magnetic variation was 19° 02′ east in January, 1885, and increases 1′.2 annually.

Tides.—The Corrected Establishment, or average time between the moon's meridian passage and the time of high water, is XIh 41m. The mean rise and fall of the tide is four and five tenths feet; and the largest rise and fall observed was five and nine-tenths feet. The average duration of the rise of the tide is 6h 16m; and of the fall 6h 09m. The times and heights of the tides for each day are nearly the same as those at Crescent City, for which the rule has already been given.

When a vessel is off the coast of Pelican Bay, the valley of the Chetko is very well marked in hazy weather, and the high, rounding, and bold front of Cape Ferrelo stands out, with the black, pyramidal rocks of Mack's Arch to the northward, showing well because the long level ridge of high sand dunes, between the Arch and Pistol River, gives them a whitish background.

Sir Francis Drake approached the coast of California on the 3rd of June, 1579, about latitude 42° and sailed—

> ...ees farther [in the same latitude] until June 5, when the winds drove the vessel towards the shore which they first descried, and anchored in a bay much exposed to the winds and thaws, and when they ceased there instantly followed thick, stinking fogs, which nothing but the wind could remove, and that was always violent.

Of course it may be questioned whether this bay was in the vicinity of Chetko or as far north as Port Orford. Nevertheless an examination of the narrative, and of the Hondius map of 1595, leaves little or no doubt in the matter, especially as the map has the Saint George's Reef laid down just under the latitude where he anchored.

Tebenkoff has the Striela (or Arrow) River in latitude 42°; from its direction and general topography it would appear to be the Chetko. On the Coast Survey charts of 1853 this stream is marked the Illinois River, that being the name applied to it by miners prospecting from Crescent City, whereas the Illinois is the south branch of Rogue River. On some maps it is called the Chitko. The Indians on this river are known as the Chitkos or Chetko-tannæ.

CAPE FERRELO.

This is the first prominent headland northward from the Dragon Rocks; but it is not the farthest point seen from the Northwest Seal Rock. That is Cape Sebastian, distant twenty nine and a half miles. From Point Saint George the farthest visible point is at Mack's Arch, distant twenty seven miles.

This bold cape is the southeastern part of a long, rounding shore making eight miles to the northwest from the Chetko; but the cape proper is only four and a half miles from Chetko Point. The shore consists of high, broken, rocky cliffs, guarded by rocks and rocky islets, some of which lie half a mile or more from shore. Along the shore are many sharp buttes, or hillocks, standing as guards above the general slopes of the immediate coast. There are notably two of these at the cape. The seaward faces of the hills are treeless, except in the gulches; on the ridges, half or three-quarters of a mile inland, oaks and pines are found in moderately thick areas. These treeless hills rise to seven hundred feet and over; behind them are the higher, wooded coast mountains.

From the Northwest Seal Rock Cape Ferrelo bears north fifteen degrees west (N. 15° W.), distant sixteen miles; and from Point Saint George north thirty-one degrees west (N. 31° W.), distant nineteen miles.

Off the rocky shore from Chetko Point are the following islets, etc.:

Grand Island lies only one-third of a mile northwest by west (NW. by W.) from Chetko Point and close under the shore. It is nearly two hundred yards in extent and sixty feet high. Sunken rocks and foul ground extend nearly five hundred yards to the south-southwest from it, with nine fathoms of water close under a sunken reef. There is no kelp around these dangers.

Between Chetko Point and Grand Island there is a small indentation known as Mack's Cove, open to the south. The width at the entrance is about three hundred and forty yards, and the depth as much to the sand beaches divided by an islet. A small rivulet empties through the western part of the beach, and there is a house on the bluff at the east side of the stream. There is a depth of four fathoms of water at the entrance to the cove, but it decreases rapidly.

Goat Island lies just two miles northwest by west (NW. by W.) from Chetko Point. It lies five hundred yards off shore, is three hundred yards in extent, and two hundred feet high. It bears north nine degrees west (N. 9° W.), distant fourteen miles, from Northwest Seal Rock. It has deep water on the southwest and west sides, but rocks, a sunken rock, and a sixteen-feet spot two hundred yards south of the southeastern point. Kelp in small quantities is found about these dangers; seven fathoms of water close outside of them, with strings of kelp running out into twenty fathoms of water at six hundred yards distance from the island.

There is a deep valley opening just behind Goat Island, with a high mound, on the east side, rising one hundred feet above the general level.

There are three or four rocky islets, reaching one hundred feet in height, between Goat Island and Cape Ferrelo. They extend nearly half a mile outside the cliffs, but have deep water, ten to fifteen fathoms, close around them and no kelp. Directly off the cape lie several small white rocks, the farthest being almost a mile off the cliffs. This is a low, double rock about fifty feet in extent, and having nearly twenty fathoms of water close around it, and from sixteen to twenty fathoms between it and the next rock inshore.

The two large, rocky islets, one hundred feet high, half a mile south-southeast of the cape, are good landmarks. They lie north-northeast and south southwest from each other and about one hundred and twenty-five yards apart. There is plenty of water around them, and four or five fathoms of water between the shore and the inner islet.

To the westward of the cape are two rocky islets, known as the Barnacle Rocks, over two hundred feet high, and lying north and south from each other nearly two hundred yards apart. A low rock lies to the westward of the inner one. These rocks lie west by north (W. by N.) three-quarters of a mile from the cape and two-thirds of a mile off shore. They have a depth of sixteen fathoms of water around them and no kelp.

At one mile south-southwest from the cape the depth of water is twenty-four fathoms over gray sand; at two miles, thirty-two fathoms over fine, dark-gray sand; at three miles, thirty-eight fathoms, and at four miles forty-seven fathoms, over blue mud.

Tebenkoff has a depth of eighty fathoms seven miles southwest half south (SW. ½ S.) from the cape. His position is approximate.

The geographical position of Cape Ferrelo Station, two hundred and twenty feet above the sea and not a hundred yards from the shore, is:

Latitude	42°	00′	03″.4.
Longitude	124°	21′	17″.6.
Or, in time	8h	17m	25s.2.

Northwestward from Cape Ferrelo to Cape Sebastian the coast is very rocky. The two capes are not intervisible, as Crook's Point projects beyond the direct bearing. Crook's Point is the first prominent point to the northwestward of Cape Ferrelo, and bears from it north thirty-six degrees west (N. 36° W.), distant nine and a half miles, the line passing over three hundred yards to the eastward of Mack's Arch. The shore-line retreats one mile to the eastward of that bearing, about midway between the two points. It has two or three small indentations, with reefs near them, which help to form small harbors of refuge to vessels that coast close under the shore to avoid the strong northwest winds and heavy swells.

Inside of the bearing to Crook's Point there is a jutting, rugged cliff, from two hundred to three hundred feet in height, with a frontage of nearly one mile. Behind it the treeless, triple-headed hill rises to seven hundred and eight hundred feet. Above that height the forest begins and rises to the crest line. This point lies north thirty degrees west (N. 30° W.) three and one-quarter miles from Cape Ferrelo.

Whale's Head.—At two and one-third miles from Cape Ferrelo, and on the above bearing, lie two rocky islets, one hundred and twenty feet high and three hundred and fifty by two hundred yards in extent, to the eastward of which is a slight receding of the bold, rocky shore, thereby forming a slight protection. The outer islet is known as Whale's Head. The cove is about two-thirds of a mile broad, northwest and southeast, and nearly half a mile deep towards the northeast. The three-fathom curve comes nearly four hundred yards out from the cliffs, and there is no kelp about the shore or rocks except a small patch east of the inner rock and inside the three-fathom line.

The soundings to the east and southeast of the outer islet are eight fathoms close to it, with bottom of fine, light-gray sand. There is a small *rock awash* directly in front of the cove. It is about fifteen yards in extent, and it lies eight hundred yards south (S.) from the highest part of Whale's Head. Around this danger the water is eleven fathoms deep. One mile outside the head the depth is twenty-two fathoms over fine, dark-gray sand.

A vessel approaching Whale's Head Cove from the southeastward must beware of a small cluster of low rocks, and two *sunken rocks* lying between the Barnacle Rocks (already described under Cape Ferrelo) and Whale's Head. They are nearer the Barnacle Rocks. The sunken rocks are close together, and lie one mile southeast half east (SE. ½ E.) from Whale's Head, with two fathoms of water around them. They are just outside the range of the rock awash, above described, and the west side of Whale's Head. The low rocks are a little inside of that range, and one and one-sixth miles from Whale's Head. They have deep water around them.

Westward from Whale's Head to Crook's Point the shore is very rocky and wild, and the rocky islets lying under it are from sixty to one hundred and fifteen feet in elevation. One of these rocky islets, over eighty feet in height, has a perpendicular face to the northwest and sloping side to the southeast, with rocks off this side. It lies close inshore, two and one-third miles southeastward from Mack's Arch and ten miles from the Chetko, following the line of the shore. It is known to the navigators as the "Leaning Rock." Three hundred yards north-northwest from this rock is a larger and higher one closer in shore, with its shore-face perpendicular and one hundred and fourteen feet high.

The fir forests begin to come down to the edge of the cliffs, but on or near the crest-line are notable open areas apparently grassy. Two of these notable spots are seen between the Whale's Head and Crook's Point; the first is Rocky Prairie, nineteen hundred and twenty five feet high, and only one and one-quarter miles from shore. The second is one and two-thirds miles northwest from this, and rises to nineteen hundred and forty-seven feet in one and one-eighth miles from the shore.

Between these elevations and the shore the land is broken and mountainous, and covered with thick forests and dense undergrowth. Half a mile off shore abreast these landmarks there is a rocky islet, called Yellow Rock. It is eighty-four feet high, two hundred yards in extent, and has fourteen fathoms of water close under its southwest face, and deep water between it and the shore.

Crook's Point.—This is a moderately low, jutting point projecting one-third of a mile beyond the line joining Cape Ferrelo and Cape Sebastian. It is noted for the many rocky islets around it, and for the extension of a line of these islets for one and one-half miles to the south, terminating in the easily-recognized islet of Mack's Arch.

The extremity of the point itself is narrow, and about one hundred and twenty feet high, with a small rocky butte. Behind this rocky butte there is a slight sag, and then the treeless land begins to rise and soon becomes densely wooded to the high crest-line. Immediately around the point is a cluster of rocky islets as high as the point itself; and some low rocks, covering an area of two hundred yards, lie seven hundred yards south of the point, with six fathoms of water close around them, and even inside of them.

There is no kelp off this point; and at one mile the depth of water is twenty fathoms over fine gray sand, and at five miles the depth is seventy fathoms over green mud.

On the northwest side of this point the shore changes to a straight three-mile sand beach, backed by sand dunes rising to one hundred and seventy feet in elevation. A great depression in the coast mountains just north of Crook's Point is also very marked.

The geographical position of Crook's Point was determined by the U. S. Coast and Geodetic Survey, and is as follows:

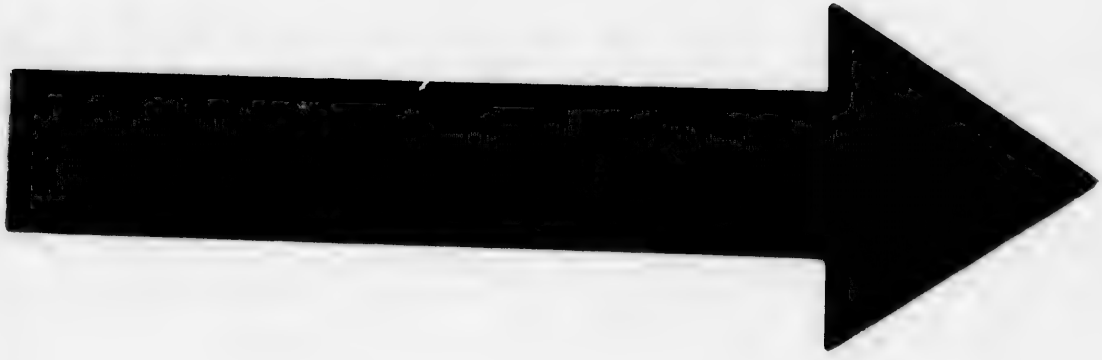
Latitude	42	15′	02″ north
Longitude	124	25′	03″ west
Or, in time	8h	17m	40s.2.

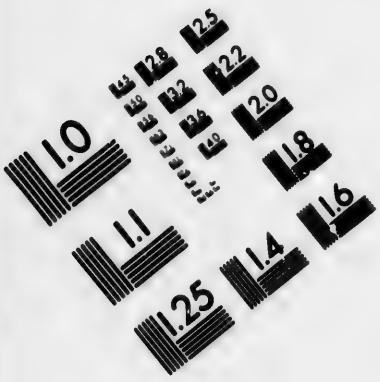
MACK'S ARCH.

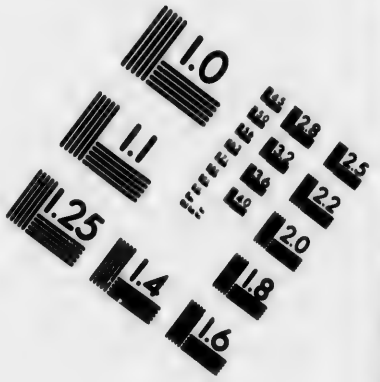
This is an easily recognized landmark to vessels that are not too far out at sea. It lies two and three miles north twenty three degrees west (N. 23° W.) from Northwest Seal Rock; two and a half miles north thirty-three degrees west (N. 33° W.) from Point Saint George; three miles north thirty-seven degrees west (N. 37° W.) from Cape Ferrelo; and six miles south twenty nine degrees east (S. 29° E.) from Cape Sebastian. It is a double headed rocky islet two hundred yards in extent, and the outer or western head rises to two hundred and twenty-eight feet above the sea. The eastern head is a little lower. Both are very black nearly to the summits, and are white, evidently from the deposits of sea birds. The arch, about forty feet in height, is in the eastern peak, and is seen directly through from the southward. The islet lies one and one-half miles south twenty nine degrees east (S. 29° E.) from Crook's Point, and is the eastern extremity of the thirty rocks and rocky islets making out in that direction from Crook's Point. It lies three-quarters of a mile from the shore to the northeastward. These rocks range from a few awash to one hundred and eleven feet elevation. The southwesternmost one is forty four feet high, with twenty fathoms of water around it, and all around the outer edge of the reef the depth is more than ten fathoms.

The main shore inside this reef is not so rocky and precipitous as to the southeastward, and the treeless hills rise rapidly in half a mile or more to several hundred feet elevation and become wooded.

The anchorage inside of Mack's Reef is fairly well protected from the heavy northwest winds and strong winds. It would be dangerous for a vessel to try to make it by passing through the reef because there are many sunken rocks, but the Arch Rock may be safely passed on the lee or windward side of it, instead of passing to leeward of it and working to northward to an anchorage. Near the head of the cove there is a patch of kelp in four fathoms of water, but has a *sunken rock* with only two feet of water upon it in the northeast part of the kelp, three hundred and fifty yards from the shore but just outside the three fathom line, and an *eighteen feet rock* two hundred yards south-southeast of that danger. The latter has no kelp about it and its outer limit from the three-fathom line. From the two-feet rock the extremity of Crook's Point bears north forty-nine degrees west (N. 49° W.), distant three-quarters of a mile, and the highest part of Mack's Arch bears south seven degrees east (S. 7° E.), distant three quarters of a mile.







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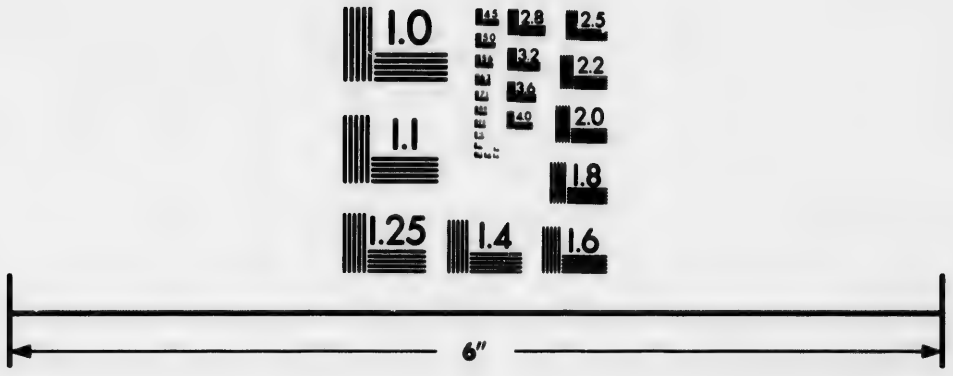

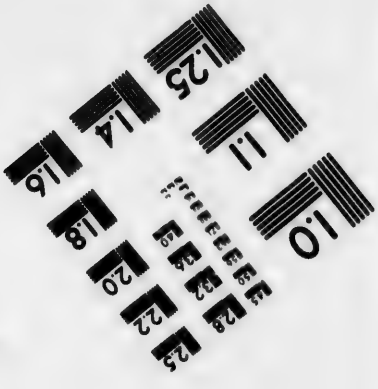

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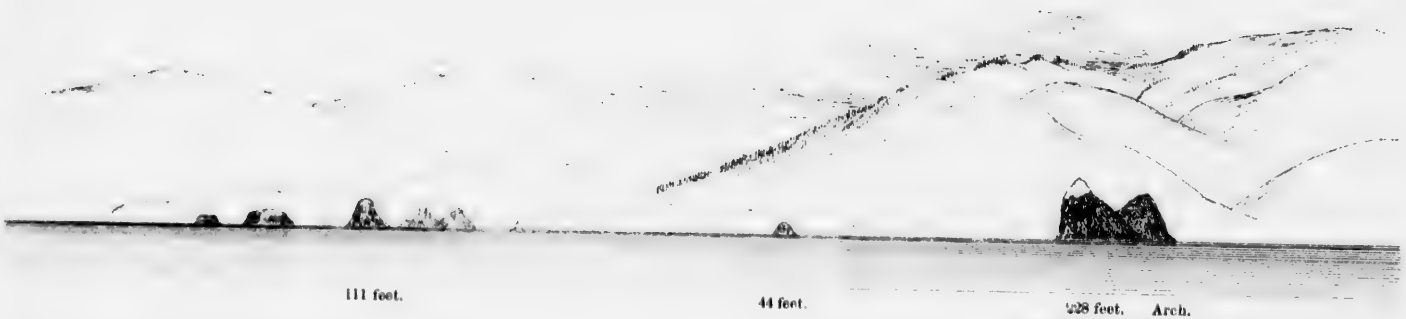
Mack's Arch Reef, NE. by N., 12½ miles. All back hills in clouds.

Mack's Arch,
NE. ¼ N., 12 miles.

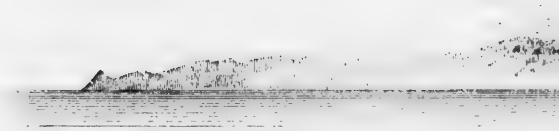


111 feet.

44 feet.

228 feet. Arch.

Mack's Arch, NE. ¼ N., 6 miles.



Cape Sebastian, N. ¼ W., 22 miles.

Cape Sebastian, N. 20° W., 20½ miles. Mack's Arch, 15 miles.

Mack's Arch, NE. by E. ¾ E., 9 miles.

All the coast-line in thick haze.

Pine Mountain, 2,280 feet.

Mack's Arch, NE. by E. ¾ E., 9 miles.

Cape Sebastian, N. 20° W., 20¼ mil

Pine Mountain, 2,280 feet.

The outer anchorage is in six fathoms of water over fine gray sand, with the highest part of Mack's Arch bearing south by east (S. by E.), distant eight hundred yards; and a rocky islet sixty one feet high bears west (W.), distant five hundred and fifty yards; but the nearest visible rock lies inside of the last rock and three hundred and sixty yards west-southwest from the anchorage.

To obtain anchorage in smoother water, a steamer might continue her course northward through the kelp and close under the inner side of the reef until the extremity of Crook's Point bears northwest one-third west (NW. ⅓ W.), and shows in line with the northeast side of the highest islet (one hundred and eleven feet) at the head of the cove. Anchor on this range in four fathoms of water, with the seventy-one-feet islet in range with the fifty-three feet islet beyond and bearing southwest three-quarters south (SW. ¾ S.). In this position the one-hundred-and-eleven-feet islet will be distant two hundred and forty yards, and the seventy-one-feet islet two hundred and fifty yards. But no sailing vessel should ever attempt to reach this inner anchorage, as there is not room enough to get under way except under steam.

The soundings outside of Mack's Arch and reef, on a southwest course, have already been given; they range from twenty-nine fathoms at one mile to sixty-three fathoms at four miles, with bottom of green mud at the latter depth. As a rule the mud bottom begins at the depth of thirty-five to forty fathoms.

A chart of Mack's Arch Cove was published in 1875. It was named by the Coast Survey in 1853.

The geographical position of Mack's Arch is:

Latitude	42° 13′ 37″ north.
Longitude	124 24′ 13″ west.
Or, in time	8h 17m 36s.9.

Tides.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XIh 35m; and the mean rise and fall of the tide is four and seven-tenths feet. The times and heights of the tides are very nearly the same as those for Crescent City or Port Orford.

Pistol River.—From Mack's Arch to Cape Sebastian the course is north twenty-nine degrees west (N. 29° W.) and the distance six miles, the line passing tangent to Crook's Point at one and one half miles from the Arch. Midway between Crook's Point and the cape the shore recedes about two-thirds of a mile, at the mouth of Pistol River, which is in latitude 42° 17½′ north.

Immediately north of Crook's Point the high, ragged, rocky shore-line changes to a low, sandy beach for two and a half miles to the mouth of the river. This beach is backed by high sand dunes reaching one hundred and seventy feet elevation inside of four hundred yards. The mouth of the river breaks through the northern end of the beach after running parallel with it for nearly three quarters of a mile and separated from the ocean by a narrow sand spit of only sixty yards in width. Inside of this beach the river is over one hundred yards wide, and its right bank is a high, bluff shore rising to higher grassy ridge. The mouth was one hundred and seventy-five yards wide in 1873, and broke through the sands just on the south side of a rocky butte, forty feet high, connected with the main land on the north by a low sand drift. In great freshets it is probable that this stream may break out across the peninsula at the great bend where it comes directly from the high mountains in the interior.

At the extreme northern part of the sandy beach there are two houses at the beginning of the rise of the grassy hill, which attains an elevation of seven hundred and sixty-six feet in six hundred yards, when the edge of the forest is reached.

No soundings have yet been made off this beach.

Northwestward from the mouth of the river to Cape Sebastian there are many rocks and rocky islets lying about one-third of a mile off the rocky cliffs, and reaching as high as one hundred and seventy feet elevation.

The Indians at the mouth of Pistol River call themselves the Ches-t'les ten-næ; south of the river they are the Hoos-tan-neh ten-næ.

CAPE SEBASTIAN.

When off the Dragon Rocks, or Saint George's Reef, the outermost visible headland to the northwestward is Cape Sebastian. It bears north thirty-four degrees west (N. 34° W.), distant fourteen miles, from Cape Ferrelo, but this course passes one-third of a mile inside Crook's Point.

From the Saint George's Reef Light-house (on Northwest Seal Rock) the cape bears north twenty-five degrees west (N. 25° W.), distant thirty miles, this course passing barely half a mile outside of Crook's Point at twenty-four miles.

Between Cape Ferrelo and Cape Sebastian the coast-line is very rocky, bordered by rocks and rocky islets which at the farthest extend out one mile from shore at Mack's Reef. The exception to this rocky shore is the three-mile line of sand dunes between Crook's Point and Pistol River, mentioned in the description of the latter. There is a series of alternating ridges and valleys along the coast and transverse to its general direction. The northwestern slopes of the mountains are generally wooded, with occasional areas of grass or green herbage on the southern slopes. But between Crook's Point and Cape Sebastian there is quite a valley drained by Pistol River.

As seen from the southward, the pitch of Cape Sebastian is quite steep for over six hundred feet, and the ridge behind it is then broken for some distance, when it rises steadily until it reaches fully two thousand feet. From this direction the flank is densely wooded.

As seen broad off from seaward, it shows as a comparatively low rocky point rising rapidly towards the north in a ridge six hundred feet high in half a mile, with a particularly scarred ocean front, very precipitous, and marked by a few trees. A grassy ridge also starts from the point and runs to the northeast for half a mile to the same height, and is then covered with trees.

There have been no soundings immediately off the cape, but the geographical reconnaissance of 1853 shows sixteen fathoms of water at an estimated distance of a mile from shore, and the indications at Hunter's Cove show ten fathoms and over at half a mile off shore. It is about twelve miles inside the usual course of the larger steam-ships; but the smaller steamers keep close under these shores to avoid the strong northwest winds of summer.

The geographical position of the Coast and Geodetic Survey station on the summit of the first pitch of the cape is:

Latitude	42° 19′ 36″ north.
Longitude	124° 25′ 58″ west.
Or, in time	8h 17m 43s.9.

The magnetic variation was 19° 18′ east on January 1, 1885, with an annual increase of 1′.2.

From Cape Sebastian we have the following bearings and distances to important objects:

Cape Mendocino Light-house	S. 20° E.	113 miles.
Blunt's Reef, off Cape Mendocino	S. 18° E.	113 miles.
Point Saint George	S. 33° E.	33¾ miles.
Saint George's Reef Light-house (building)	S. 25° E.	30 miles.
Mack's Arch	S. 29° E.	6 miles.
Rogue River Reef	N. 33° W.	8½ to 10½ miles.
Port Orford Head	N. 26° W.	25 miles.
Cape Orford Light-house	N. 30° W.	31½ miles.
Fox Rock, southwest extremity of Orford Reef	N. 38° W.	28 miles.

The name Sebastian was applied to this cape by the U. S. Coast Survey in 1869.

CAPE SEBASTIAN TO PORT ORFORD.

Cape Sebastian.—There is a *sunken rock* one mile northwest half north (NW. ½ N.) from the western point of Cape Sebastian. It lies half a mile off shore, but the depth of water upon it is not known.

Hunter's Cove.—Under the southern part of Cape Sebastian there is an indentation of the coast-line for half a mile to the northeastward, and directly in the face of this cove is a large, rocky, flat-topped islet, called Hunter's Island, nearly a quarter of a mile in extent and rising one hundred and sixty feet above the sea. It lies one-quarter of a mile southeast by south (SE. by S.) from the cape, and its inner side is one-third of a mile from the shore. When seen from seaward the steep cliffs inside of it rise high and look gray and washed, with brighter, broken hills, and trees behind them. Still farther in are higher, tree-clad mountains.

This islet has no deep water close to it, as the other islets in this section of the coast usually have, but the three-fathom line is one hundred and twenty-five yards outside of it, and on the inside a broad, sandy shoal, with only ten feet of water upon it, reaches to the shore. Close under the southeast side of the rock there is a depth of four fathoms of water over dark-gray sand.

The cove proper is between the cape and this islet, but the three fathom line is one hundred yards from either shore, and the entrance to the cove is reduced to three hundred yards, being

five fathoms of water in the middle. The cove is contracted inside the entrance by the three-fathom line coming out four hundred yards from shore, except towards the southeast part of the cape. A vessel may anchor in three and a half fathoms, with the cape bearing west by south (W. by S.), distant one fifth of a mile, and the inner edge of Hunter's Island bearing south by east half east (S. by E. ½ E.), distant one-quarter of a mile. There are *sunken rocks* two hundred and fifty yards to the east-southeast of the anchorage with fourteen feet of water, and one is visible at extreme low tides.

This certainly seems to be a very dangerous place and entirely impracticable for a sailing vessel. From the chart it appears as if an equally sheltered anchorage might be had close under the southeast side of Hunter's Island, where the water is deeper and where there also appears to be more room to get under way.

Half a mile outside the cove the depth of water is twelve fathoms, but the bottom is irregular and rocky. There is no kelp about this cove.

A chart of this cove was published in 1875.

Hydrography.—Off the coast from the Chetko River to Cape Sebastian the hydrographic survey has been done in part. The three fathom curve is close under the rocky cliffs; the twenty-fathom curve averages less than a mile from shore, and all the rocky islets are inside this depth.

Some depths off Cape Ferrelo have already been given. On a south course from that cape at one mile the depth is twenty-two fathoms over fine dark-gray sand; at two miles it is twenty-seven fathoms; at three miles, twenty-eight fathoms over dark-gray sand; at four miles, thirty-two fathoms over fine dark-gray sand; at five miles, thirty-seven fathoms over dark sand and blue mud, and at six miles, forty-one fathoms over blue mud. Eastward of this line, towards the Chetko Anchorage, the soundings are less at the same distances. In a southwest direction from the cape the soundings increase more rapidly. The depth at one mile is twenty-eight fathoms; at two miles, thirty-five fathoms, bottom hard sand and rock; at three miles, forty-three fathoms over blue mud and fine gray sand, and at four miles forty-nine fathoms over blue mud.

Off Mack's Reef on a southwest course the depths increase still more rapidly. At one mile from the Arch Rock the depth is twenty-nine fathoms over fine dark-gray sand; at two miles, forty seven fathoms over blue mud; at three miles, sixty fathoms, and at four miles sixty-four fathoms over blue and green mud.

As at the Winchuk, so along the shore from Chetko River to Mack's Reef, a strong shore-current has been experienced running to the northwest.

Hunter's Creek.—Four miles southward of Rogue River, and therefore two miles northward of Cape Sebastian, there is a small stream named Hunter's Creek emptying into the sea; and we are informed that "about two and a half miles off this creek there are two *breaks* which show only in rough southerly weather," but no bearing whatever is stated.

There are three *visible rocks* off Hunter's Creek. The outer one is the middle one and is two-fifths of a mile off shore, three and two-thirds miles north by west two-thirds west (N. by W. ⅔ W.) from Cape Sebastian. It is inside the bearing of the north point of Rogue River entrance from Cape Sebastian. The mouth of this Creek is four miles north by west (N. by W.) from Cape Sebastian.

THE ROGUE RIVER.

We have no detailed surveys of this river. The mouth of the river is six miles north eighteen degrees west (N. 18° W.) from Cape Sebastian, and the shore is nearly straight, with a slight recession to the eastward. The western part of the north head of Rogue River is nearly seven miles north twenty degrees west (N. 20° W.) from Cape Sebastian, and nearly on a line to Humbug Mountain. This north head rises to seven hundred feet elevation at one and four-fifths miles north of the mouth. When a vessel is well out at sea the position of Rogue River Valley can readily be determined by the marked depression in the coast range. On the north and south of where it breaks through these mountains they rise above twenty five hundred feet, and the stream cuts through deep cañon-like valleys. When a vessel is close under the shore, two or three white houses are seen on the south point of the entrance. To the northward of the river long, brown, grass-covered hills run north for three miles, with a few trees on the ridge and a few patches of forest on the flank. Behind this ridge and fifteen or twenty miles inland there is a very high range of mountains, dark and faint blue, but not crested with trees.

The entrance to Rogue River is in latitude 42° 25′ north, and longitude 124° 25′ west, both approximately close.

The channel to Rogue River is very narrow, with a depth of only four or five feet of water on the bar; at the time of the last report the direction of the channel outwards was northwest by north (NW. by N.), or close under the northern shore. There is a small steam-tug stationed at Rogue River, and two small scow schooners ply between that river and San Francisco.

The entrance lies between two long, narrow sand points; the one on the south side is one mile long, and makes out from the seaward foot of the wooded hills. The one on the north side is three-quarters of a mile long and makes out from the high, grassy hill, bare of trees, and rising to one thousand feet elevation. There are two large rocks off its seaward base. There was a large white house at the southern foot of this hill and near the river bank that was a good landmark. The river between the sand spits is very contracted, but inside it expands to a width of three-quarters of a mile. When passing close to it in the geographical reconnaissance of 1853, in moderate northwest weather, the sea was breaking heavily across the bar; but in 1871 it was reported to have an unusually smooth bar unless a heavy swell was setting in. The average depth of water for five miles inside the entrance is about fifteen feet, with occasional rapids; the tide is said to make up about six miles.

Vessels bound for the river in summer, the only time when it is possible to enter it, work to the northward close under the shore from Pelican Bay, keeping clear of the dangers already described. After passing Cape Sebastian the coast-line is clear to Rogue River.

On the south shore of the river, and about three-quarters of a mile inside the mouth, lies the village of Ellensburgh, with a population of two hundred or three hundred people. There is a large cannery here, and extensive salmon fisheries. A large saw-mill, named Gammon's, was established here for cutting the sugar-pine which abounds up the river. Numerous dairy and stock ranches are found along the river valley.

A coasting steamer formerly ran to this place and crossed the bar by ranges of black and white balls shown from the inside, and a signal flag from the cannery when the tide was favorable. It was found that the bar often shifted in position and changed in depth; the strong current seems to cut it away very easily. This steamer drew seven feet when light and eight feet when loaded, and always passed the bar only at high water and when the sea was smooth enough. Her master reported that there was usually but one breaker on the bar, and a depth of fifteen to eighteen feet inside. He had entered over thirty times up to 1877.

In 1887 the coasting steamer *Thistle* regularly entered the river without regard to the conditions of the weather during the summer.

In the spring of 1850 the pilot-boat *Flagstaff* entered the river and, being attacked by the Indians, was deserted, plundered, and burned. The next vessel that entered was the schooner *Sam. Roberts*, in July of the same year; she got out safely.

In 1850 Lieutenant McArthur reported that there was a depth of ten feet on the bar, but that the channel was too narrow for sailing vessels to turn in. He did not enter the river; in fact his track is laid down outside the Rogue River Reef.

Eleven miles west by south (W. by S.) from the mouth of Rogue River La Pérouse gives a sounding of eighty fathoms on his chart.

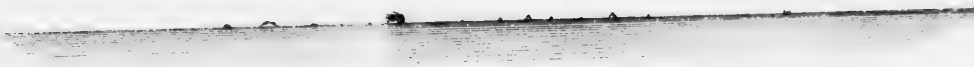
Rogue River rises one hundred miles to the eastward and has numerous branches in the broad, elevated plateau north of the Siskiyou Mountains. Its tributaries reach from the Umpqua on the north to the Klamath on the south, and east to the Cascade Range. It breaks through the coast range about ten miles north of its mouth, and this break-down of the mountains is a decided feature when a vessel is off this part of the coast.

The name of the river was suggested in 1851 by the dishonest propensities of the natives in its vicinity, but the Indians have long since been destroyed. The Indians at the mouth called themselves the Yosh-u tan-nae, and those just above the mouth were the Too-too tan-nae. On some charts and maps the river has been called the Toutoumis, and the Too-too-tut-na or Klamet. Tebenkoff has the river Gounde in latitude 42° 22′ and eight miles south of his location of the reef. (Gounde is not a Russian word.) He has no other stream hence to the Orford Bight, into which opens the river Tituna, or Elk River.

Lake Buttes.—Six and one-third miles north seventy-four degrees east (N. 74° E.) from the mouth of Rogue River are seen the Lake Buttes, which reach thirty-eight hundred and fifty feet elevation, and are therefore visible at a distance of seventy miles.

From the mouth of Rogue River to Cape Orford Light the bearing is north thirty-three degrees west (N. 33° W.), and the distance twenty-six miles.

Rogue River Reef. N. by W., 10 miles.



Rogue River Reef. NE. by N., 10 miles.

Rogue River Reef. E.NE., 3 miles.

Rogue River, North, 8 miles. (1853.)

Needle Rock, Rogue River Reef,
about 85 feet high. NE. by E., 2 miles.

Rogue reef,
miles.

Rogue River was discovered by Sir Francis Drake in 1579; it was named El Rio de los Todos Santos on the manuscript chart of Dudley.

THE ROGUE RIVER REEF.

The rocky islets forming this reef are not so large and conspicuous as those of the Dragon Rocks or the Orford Reef; and they run more nearly parallel with the coast-line.

This dangerous reef has not yet been carefully examined, and therefore the description must necessarily be general. We passed it in 1885, when on the usual steam-ship course and the weather unfavorable. There are two groups of rocks. The outer and southern one lies west half north (W. ½ N.), about four miles from the north head of Rogue River, and stretches northward somewhat parallel with the coast for three miles, where a gap occurs between them and the inner group lying a mile and a half off shore. Off this inner group lie several dangerous sunken rocks, which must be sharply watched from aloft when the sea is not heavy enough to break upon.

The channel through this reef is perhaps a mile wide, but appears more dangerous than any on the coast. In 1853 we passed through it on the surveying steamer with a look-out in the fore-top, but it has never been used by the coasting steamers, although it would be a great advantage to them if they could go through it in heavy northwest weather when working up close under the shore. On the reconnaissance sheet of 1853 a depth of eighteen fathoms is given in this channel.

As seen from the southward, the inside rock of the outer group shows a perpendicular face eastward, and sloping to the west. Off the main rocky islet, which is estimated about one hundred feet high and one hundred feet base, but spreading out to a much greater breadth close to the water, there is an eighty-feet needle of rock which shuts on the southern edge when it is a little past the beam. This isolated needle rock (or perhaps a broad, flat rock seen edge on) stands out when the islet bears northeast by east and continues separated until it is past the bearing of east northeast. When this principal rocky islet bears northeast by east (NE. by E.), it appears under a near mountain crested with trees and gullied on the southwest side, with the long grassy ridge reaching in front of it from the north point of Rogue River entrance. Outside of this highest islet, a quarter of a mile to the west or west-northwest, is a jagged mass of rock, twenty feet high and one hundred and fifty feet in extent, which had sea-lions upon it; and then half a mile to one mile to the west-northwest or northwest by west, there are two very low, ugly patches of rock, three to five feet above water and fifty feet in extent. There is no break outside of this last visible ledge; and we passed within three-quarters of a mile of it. It is reported that there is a constant break about west-southwest from the entrance to the river, though the distance is not given; but as far back as 1869 this danger was reported by Captain Metzgar to lie south by east (S. by E.) from the largest rock of the reef, and west southwest (WSW.) from the mouth of the river. Other breaks show only in heavy or southerly weather. There is reported to be a depth of ten fathoms over sandy bottom at two miles broad off the mouth of the river, and the anchor holds well and is not easily weighed.

The following bearings and distances locate the Rogue River Reef:

From Saint George's Reef Light (Northwest Seal Rock) on the line to Cape Orford Light	N. 26° W.	39 miles.
From Port Orford Head	S. 22° E.	15 miles.
From Fox Rock (the outermost rock of the Orford Reef)	S. 35° E.	1⅝ miles.

The Indian name of the Rogue River Reef is U-ki-ti-sae.

Rogue River Reef.—The reconnaissance survey of 1888 affords the following data about this reef:

The principal rock, which is that one having the needle alongside of it, is seven and three-quarters miles north thirty-seven degrees west (N. 37° W.) from Cape Sebastian, and twenty-three and three quarters miles south twenty-eight degrees east (S. 28° E.) from Cape Orford Light-house.

The *outer* reef consists of an irregular cluster of fifteen or more visible and sunken rocks extending from abreast the mouth of Rogue River for three miles northwestward. The northwestern part of the reef is composed of visible and sunken rocks; the southeastern limit of sunken rocks. The reef has a general northwest by north and southeast by south trend; it is three miles long and about one mile wide, and lies about three and a quarter miles off the shore. The northwesternmost rock is visible, and off the southeastern end is a very dangerous sunken rock which lies three miles south thirty-two degrees east from the former. This sunken danger is fully one mile south of the southeast part of the reef and two and two-thirds miles off the south point of Rogue River

entrance and nearly abreast of it. It is reported that there is still another sunken rock somewhat farther to the southward.

The breadth of the reef is one and one-third miles, and the innermost rocks are one and one-third miles from the shore. The southeastern rock nearest the shore is sunken, but only one quarter of a mile from the visible rocks.

The *inner* reef commences two-thirds of a mile northwest from the north point of Rogue River, at only half a mile from shore, with sunken rocks; thence the shore trends to the north by west, and the western edge of the reef runs four and a half miles northwest by north one-third north (NW. by N. ⅓ N.) to the farthest sunken rocks, which lie nearly two miles from shore and are half a mile from the nearest visible rock inside. The southern part of the inner reef is therefore three and one-fifth miles north by east one-quarter east (N. by E. ¼ E.) from the northwestern point of the outer reef.

The *Rogue River Reef Channel* lies between the outer and the inner reefs; its general direction is northwest half north (NW. ½ N.), and its length three and a half miles, of which the southern part, one and a half miles long, has a width of four-fifths of a mile. The southern entrance to this narrow part of the channel is one and a half miles west by north from the mouth of Rogue River.

Needle Rock.—Three of the rocky islets of the Rogue River Reef are of considerable size and height. The largest, with the high needle on the southern side, is one hundred and twenty feet above the sea, and bears north seventy-seven degrees west (N. 77° W.) three and one-third miles from the mouth of Rogue River. This rock is nearly in the middle of the group. *Double Rock* is sixty-five feet high and bears north seventy-nine degrees west (N. 79° W.), distant three and five-eighths miles from the mouth of the river, and *Pyramid Rock*, fifty feet high, bears north seventy-four degrees west (N. 74° W.), distant two and a half miles from the river. The rest of the rocks are much smaller, and range from twenty-five feet in height to barely awash at high water. The outermost or northwestern rock is about ten feet above the sea, and bears north seventy-two degrees west (N. 72° W.) four and a half miles from the mouth of the river. The most dangerous of the *sunken rocks* is one which bears south sixty degrees west (S. 60° W.), distant three miles from the river and distant two and a third miles south sixteen degrees east (S. 16° E.) from the largest, or Needle Rock. The sea breaks upon this danger only at low water when there is a heavy swell running. It was noticed during the survey that large steamers, hugging close to the coast during strong northwest winds, often passed very close to this break, if not actually inside of it. It is therefore a question whether a whistling buoy might not be placed here. But it is reported that there is still another danger farther to the south, upon which the swell breaks very rarely.

The small coasting steamers sometimes use the Rogue River Reef Channel. It is said to carry nine fathoms of water over rocky bottom, but until a hydrographic survey is made it will be well for the large steamers to avoid it. (The survey is to be made in 1889.)

Northward from Rogue River the coast is high, rocky, and compact. The mountains are high, irregular, dark, and covered with chaparral. A few miles northward of the Rogue River entrance the coast mountains are marked by a decided break-down; this is doubtless occasioned by the passage of the Rogue River coming from the east northeast through the range.

About three-quarters of a mile from the Rogue River mouth the shore commences to be bordered by many rocks, which gradually recede from the land, although there are very many close under the rocky cliffs for four and a half miles, when it becomes comparatively free for four and a half miles more to Ukah Creek and nearly a mile beyond. The general trend of the shore for these nine miles is north half west. Thence the shore sweeps in irregular trends for eleven miles to Port Orford. It is rough, formed by high rocky cliffs, and bordered by hundreds of large and small rocks.

The distance to the western point of Port Orford is nineteen miles, and the bearing north thirty-one degrees west (N. 31° W.); but the coast-line takes a long, curving swing about four miles to the eastward of this course. From the mouth of the river to Island Rock, off Humbug Mountain, the distance is fourteen and a half miles, and the bearing north twenty-eight degrees west (N. 28° W.). The Inner Rogue River Reef and other rocks skirt the rocky shore-line for five miles, and thence for four miles the coast is not so high and is comparatively free from dangers. For these nine miles from Rogue River the coast-line is very nearly straight on a north course. Then it bends out to the northwest as far as Cape Orford for eighteen miles, with the small irregularity at Humbug Mountain, and the large indentation at Port Orford.

Rogue River Reef, ESE., 4½ miles.

Humbug Mountain (wooded), 1,877 feet. Island Rock, 4 miles Southeast of Port Orford Head, ESE. 13½ miles, 264 feet.

Klooqueh Rock. Port Orford Head, NE. ¼ E., 9½ miles. Rocks in East part of harbor.

Ukah Creek.—In the deepest part of the bight there is a small stream called Ukah Creek entering the sea. On some of the maps it is called Savage Creek. It has a very short course, and rises southeast of Pilot Knob. The Indians upon it were the U-kah tan-na.

This small stream empties into the ocean in latitude 42° 33⅗′ north and longitude 124° 22⅝′ west. It has a narrow mouth opening to the northwest, and has a large lagoon inside swelling to the southeastward.

South of the mouth the shore is comparatively clear; to the north the rocks commence in a little more than half a mile. Two miles directly up the lower valley and east of the mouth there is a mountain fourteen hundred feet high. Two miles behind this the mountains reach an elevation of twenty-two hundred feet.

Along this portion of the coast the depth of water is thirty fathoms at one mile from shore. In smoky weather the shore can not be made out in detail from the steamers, but the mountains, which reach three thousand feet elevation, afford good landmarks.

The Sisters.—The first of two somewhat prominent projections in this shore-line is the Sisters, which are ten and a half miles north fifteen degrees west (N. 15° W.) from Rogue River and nine and a half miles south forty-nine degrees east (S. 49° E.) from Port Orford Head. The Sisters are three rocky islets that lie nearly north and south of each other in a space of one mile. The northern and largest one, three hundred and fifty yards in extent and four hundred and five feet high, lies close by a high, rock-pointed cliff. This cliff is two hundred and sixty five feet high.

The second one is two hundred yards south of the largest, two hundred feet high, and only one hundred and fifty yards across. The outermost islet is only five feet above the water, one hundred and fifty yards long east and west, and six hundred yards south of the second islet. There appears to be a small cove and moderately smooth water under the south side of the point, and it is protected by the largest islet, but has sunken rocks in it. On the north side of the point the largest islet forms a small cove there, but the shore is rocky and it is doubtful if there is any refuge there. Two miles eastwardly from the Sisters the mountains rise to an elevation of two thousand feet.

About one and a half miles northward of the Sisters' Cove and two miles south of Humbug Mountain there is reported a singular and noticeable rocky head jutting out from the shore. The seaward face is very steep and is estimated to be over two hundred and fifty feet in height. It is known as the *Lookout Rock*, but the Indian name is Nog-gi-sa.

HUMBUG MOUNTAIN.

When within four miles of the western point of Port Orford, the coast is very rocky, high, and precipitous; so much so that the coast-trail has to go far into the interior. In two thirds of a mile the rise is eighteen hundred and seventy-seven feet to the summit of Humbug Mountain, a notable peak used as a landmark, but occasionally masked in the haze with higher mountains behind it. It is a remarkably regular conical mountain, seventeen hundred and ninety feet high. It has a sharp, high, rocky cliff point for its westernmost extension, off which lie Island Rock and its needle at a distance of one and a quarter miles to the southeast half south.

The seaward and south faces of the mountain are covered with bushes, fern, and grass, and no trees; the north side is pine covered, and this is a very marked feature, as there are none others like it in the vicinity. It is well made out by vessels north of Cape Orford.

Behind this mountain and half-way round its base there is a moderate stream of water which nearly cuts through to the ocean one mile southeast of the mountain, and then sweeps in a regular semicircle round to the north and west, and empties one mile northwestward of the point. This is Brush Creek.

From the mouth of Brush Creek the coast is rocky, high, and wild to Port Orford.

The west point of Humbug Mountain is fifteen and a quarter miles north twenty-three degrees west (N. 23° W.) from Rogue River; and south fifty-eight degrees east (S. 58° E.) from Port Orford Head. The approximate geographical position of the mountain is:

Latitude	42° 40¼′ north.
Longitude	124° 25¼′ west.

It bears south fifty degrees east (S. 50° E.), distant eleven miles, from Cape Orford Light, the line passing over the land well to the eastward of Port Orford Head.

In 1853 this mountain was known as Mount Franklin; the Indian name is Me'-tus.

Island Rock.—At one and one-quarter miles off the seaward face of Humbug Mountain lies a barren, rocky islet, three hundred and fifty yards in extent and rising two hundred and sixty-four feet above the sea. It has a general wedge shape north-northwest and south southeast, with a moderately horizontal summit line. Close under the northwest point of this islet there is a sharp needle-rock rising one hundred and fifty-five feet above the sea. Deep water is reported around these rocks, and the reconnaissance sheet gives thirty-five fathoms just to the southward. There is a safe passage inside of them.

Around the northwest base of Humbug Mountain flows Brush Creek, which opens on a long, narrow, low-water beach.

THE LANDFALL OF PILOT KNOB, OR BALD PEAK.

This mountain, twenty-eight hundred and fifty feet high, is only three miles in from the nearest shore. It is fourteen and one-third miles south sixty-three degrees east (S. 63° E.) from Cape Orford Light house, twenty-one miles north nine degrees west (N. 9° W.) from Cape Sebastian, and four and a quarter miles east half north (E. ½ N.) from Humbug Mountain.

The approximate geographical position of the mountain is:

Latitude	42° 39′ 40″ north.
Longitude	124° 20¼′ west.

It is part of a mountain mass which shows as a notable peak from the northwest of Cape Orford, from which it bears south sixty-two degrees east (S. 62° E.), distant fourteen and a half miles. This mountain range is a great, almost impassable, barrier lying between Rogue River and the Coquille; and the water-courses flowing into the Pacific between these two rivers are short and small. A vessel coming from the north, when far beyond Cape Orford, sees the Bald Peak as a double peak above all the immediate mountains. These peaks gradually open, and finally, when south of the cape, there are three flat, pyramidal peaks of nearly the same height. The two flatter and western peaks are wooded on the north slopes; the eastern is Bald Peak and is not wooded. We have seen it in the early morning when over fifteen miles to the northwest of Cape Orford. When the cape bears south sixty-four degrees east (S. 64° E.) the two tops of Bald Peak show as one and almost in range with it; and when it bears north forty degrees east (N. 40° E.) the eastern summit of Bald Peak appears as the highest point of a bold, ragged ridge starting from the break-down immediately behind Humbug Mountain.

Bald Peak is three thousand and fifty-six feet above the sea, and should be seen at a distance of sixty-two miles. It should be visible from a vessel when up with the Northwest Seal Rock, or when abreast of Cape Gregory.

The Indian name of the mountain is Chus-sug-gel.

PORT ORFORD.

Approaching Port Orford from the southeastward, vessels have no difficulty in making it out in clear weather, both from the landmarks on the mainland and the high islets of the Orford Reef, when they are nearly up with it. But when a vessel is between Mack's Arch and the Rogue River Reef, and ten miles off shore, the farthest land seen to the northward is not Port Orford Head nor Cape Orford, but a flat-topped hill apparently on the coast beyond the latter. Port Orford is therefore well under the land inside of this extension. If a vessel is beating up the coast she should make short tacks after passing the Saint George's Reef; she can run well under the land except near the Rogue River Reef, fifteen miles south of Port Orford. In this way she avoids the large west-northwest swell and the possibility of fogs; the depth of water is good even close to the Island Rock, four miles southeast from Port Orford, and the other islets between it and the anchorage.

When the coast steamers are about seven miles off shore, bound northward, the top of the ridge running to the east from Port Orford Head shows a marked depression in it, as is indicated by the topographical survey.

In thick weather a vessel will not approach the shore closely until satisfied of being north of Rogue River Reef, and then Island Rock, already described, may possibly be picked up, or the five high rocks one and three-quarters miles north by east half east (N. by E. ½ E.) from Island Rock.

The Five Islets.—Each one of this group of rocks is quite small in area, but they rise from ninety-six to one hundred and eighty-three feet above the sea, with a close cluster of sunken rocks one

hundred yards inside the highest one. The whole group covers an area of about four hundred by three hundred yards, and lies nearly four hundred yards off the steep shores between Rocky Point and Coal Point. These high rocks lie two and one-quarter miles south fifty-eight degrees east (S. 58° E.) from Tichenor's Rock, off Port Orford Head, and two and a quarter miles south thirty-eight degrees east (S. 38° E.) from the anchorage. We do not yet know whether there is a passage between them and the shore, or what the depth of water is along their western sides.

From the Five Islets to Coal Point, which forms the eastern limit of this harbor, the bearing is north half east (N. ½ E.), and the distance one and one-quarter miles.

Tichenor's Rock, forming the southwest point of the harbor, is a narrow, rocky islet two hundred and fifty yards long north-northwest and south-southeast, by about fifty yards wide and ninety feet high. It lies one hundred and seventy yards from the extremity of Port Orford Head, but there is a depth of five fathoms in the passage between, and if a vessel were forced to run this channel she would have water enough. There is a depth of fifteen fathoms all around the east, south, and west sides of this rock.

Klooquch Rock.—This is a good mark for the approaches, but more particularly when coming in from the northwest through the channel between the reefs. It lies seven-eighths of a mile north fifty-eight degrees west (N. 58° W.) from Tichenor's Rock, and nearly one-third of a mile off the northwest face of Port Orford Head. It is about one hundred and twenty yards long, northeast and southwest, and fifty or sixty yards wide. It is black, slightly pyramidal, and rises to an estimated height of fifty or sixty feet. This rock is readily made out from a vessel several miles outside the Orford Reef.

Port Orford is by far the best summer roadstead on the coast between Point Reyes and the Strait of Fuca. It has deep water, is readily approached from the southward, and affords fair protection in heavy northwest winds. In winter it can be approached only in favorable weather. The line of eight fathoms is only half a mile from the north and east shores and comes quite close to the west shore. The roadstead is formed by the high shores from the southeastward sweeping from Coal Point to the northwest by west for one and three-quarters miles to the deepest part of the bight at Battle Rock, and then trending to the southwest by south half south for one mile to the south point of Tichenor's Rock off Port Orford Head. In this southwestern sweep of the shore-line the cliffs rise almost vertically to two hundred and fifty feet, and are very ragged and wild. From Tichenor's Rock to Coal Point, which may be considered the farthest extent of the bay, the distance is two miles and the bearing exactly east. This line passes over from sixteen fathoms of water near the rock to twelve fathoms in the middle of the bay, and to six fathoms within one-quarter of a mile of Coal Point. The extent of the indentation to the northward of the line between Tichenor's Rock and Coal Point is one mile. The deepest water is close under the cliffs of the northwest shore, three fathoms being had within less than one hundred yards from each projecting point. On the north and northeast shores the cliffs are not so steep nor so high, and there is a low-water sand beach almost to Coal Point, off which lie many small rocks, but none more than one hundred and fifty yards from shore. On this north and northeast shore the three-fathom line lies nearly one-quarter of a mile from the beach from near Battle Rock to some small rocks lying five-eighths of a mile to the east southeast; thence to Coal Point the three-fathom line is one-fifth of a mile from shore.

Port Orford Head.—The rocky point forming the western limit of the bay presents a very rugged and precipitous outline, and rises to the height of three hundred and fifty feet. Its surface is covered with an excellent soil and with a sparse growth of pine. This point is known as Port Orford Head, and it is very readily made out by a vessel coming from the northwest. It opens west outside Cape Orford when the latter bears southeast, but of course the higher land beyond must not be mistaken for it.

From this head the shore becomes depressed to about sixty feet at the northernmost part of the bay, where the town is located. The hills behind are covered with a thick growth of pine and cedar.

In the northernmost part of the bay, abreast the town, is *Battle Rock*, stretching out as a high, narrow, black wedge from the steep shores behind it. This is a guide in making the immediate anchorage when a vessel is under the land. When the atmosphere is hazy this rock stands out as if it were detached from the shore. Eastward from this rock the steep shore is skirted by a sand beach for one and three-quarters miles to Coal Point. Almost midway in this distance there is the mouth of a small creek, called Hubbard's Creek, whose banks are composed of a

deposit of auriferous sand and gravel. The same deposit is found in the cliffs at the mouth of Gold Run, just east of Battle Rock, and has yielded as high as thirty to forty dollars per diem to each miner.

The anchorage in this bay is usually made in six fathoms of water, hard, sandy bottom, with Battle Rock bearing north (N.), distant one-third of a mile; the first high point to the west of Battle Rock bearing west northwest (WNW.), distant one-quarter of a mile, and the south point of Tichenor's Rock bearing southwest (SW.), distant three-quarters of a mile. In this position the rocks on the edge of the three-fathom line lie half a mile to the eastward.

Steamers can anchor a little to the northward or northeastward of this position in four fathoms of water.

Coasters from the south in summer beat up close in shore. From the northwest they come through the Orford Passage, keep just outside of Klooqueh Rock, in twelve fathoms of water, and round Tichenor's Rock as close as prudent in fifteen fathoms. At a quarter of a mile off it the depth is twenty fathoms. In an urgent emergency they can pass between Tichenor's Rock and the point.

In winter, vessels must anchor far enough out to be ready to put to sea when a southeaster comes up; and in case of necessity they may seek an offing through the Orford Passage.

The usual landing is between Battle Rock and the high point of rock close to its west flank. Sometimes a landing was made on the rocky beach a quarter of a mile westward of Battle Rock in the bight where a grassy, sloping bluff comes to the water. In 1885 a wharf was built out from this bluff to twelve feet of water at low tide, and a road was cut up along the bluff and connected with one of the streets of the town. Small sailing vessels lie at the wharf to load and discharge, but steamers anchor a short distance off it.

A saw-mill has been in operation for a number of years about five miles from the port between Sikhs River and Elk Creek, but it was moved in 1887 to near the mouth of Sikhs River, and it is intended to connect it with Port Orford by a railroad. It is principally devoted to manufacturing the celebrated Port Orford cedar into marketable lumber. Salmon from Sikhs River and the products of the numerous stock-ranches in the surrounding country are also shipped from Port Orford. The town has increased considerably in size and, including the people in the immediate vicinity, contains a population of about three hundred and fifty to four hundred. One of the coasting steamers calls here regularly in favorable weather.

The primary astronomical station of the U. S. Coast and Geodetic Survey, established here in 1851, is on the top of the ridge just west of the town, at a height of two hundred and sixty-two feet above the sea and within a few yards of the almost vertical cliffs two-fifths of a mile west-southwest from Battle Rock. Its geographical position is:

Latitude	42° 44′ 21″.7 north.
Longitude	124 28′ 47″ west.
Or, in time	8h 17m 55s.1.

The magnetic variation was 19° 27′ east in January, 1885, with a yearly increase of 1′.4; but the maximum of the easterly variation has been very nearly reached.

For the use of navigators we note the geographical position of the secondary astronomical station of 1853, which was in front of the town just north of Battle Rock, and within fifty yards of the edge of the bluff, as follows:

Latitude	42° 44′ 28″.2 north.
Longitude	124° 28′ 13″ west.
Or, in time	8h 17m 52s.8.

Tides.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is X1h 32m. The mean rise and fall of the tides is four and eight-tenths feet; of spring-tides five and nine-tenths feet, and of neap-tides three and seven-tenths feet. The mean duration of the rise is 6h 17m, of the fall 6h 08m, and of the stand 0h 39m. The average difference between the Corrected Establishment of the a. m. and p. m. tides of the same day is 1h 22m for high water, and 0h 40m for low water. The differences when the moon's declination is greatest are 2h 12m and 1h 28m respectively. The average differences in height of those two tides are one and four-tenths feet for the high waters, and two and six-tenths feet for the low waters. When the moon's declination is greatest, these differences are two and three-tenths feet and three and nine-tenths feet respectively. The average difference of the higher high and lower low waters of the same day is seven and one-tenth feet, and when the moon's declination

greatest, eight and two-tenths feet. The higher high water in the twenty-four hours occurs about 10h 54m after the moon's upper transit (southing) when the moon's declination is north; and about 1h 05m before when it is south. The lower of the low waters occurs about seven hours after the higher high waters. The greatest observed difference between the higher high and lower low waters of one day was 11 feet.

To find the time and height of every tide throughout the year consult the Pacific Tide Tables published annually by the U. S. Coast and Geodetic Survey. For any required tide obtain from the table the time and height at Astoria; and then from the given time of high water subtract 1h 13m and from the given height subtract one and six-tenths feet; from the given time of low water subtract 1h 29m and from the height subtract one-tenth of a foot.

One of the drawbacks to the development of the country about Port Orford has been the difficulty of finding a practicable road thence to the interior, where the mines and grazing country afford a large traffic. In this vicinity were immense forests of the largest and finest Port Orford cedar, unapproachable in quality by any on the Atlantic coast. Great destruction in these forests was occasioned by fires, but there are still large areas not yet cut or burned over. North of Port Orford the country is being settled by stock-raisers; and efforts have been made to send to market a fine sandstone for building purposes.

During a protracted and heavy gale from the southward in December, 1851, when we were encamped on the Head, such a terrible sea rolled in that no vessel could have ridden it out. The old steamer *Sea Gull* was driven northward to Vancouver Island and lost two weeks in regaining her position; and the mail-steamer *Columbia* hardly held her own for many hours off the Orford Reef.

This harbor is called Indian Bay in Tebenkoff's Atlas of Charts of 1848. He has especially marked the Island Rock and Klooquch Rock, with thirty-eight to forty-five fathoms of water outside the former. His text does not mention the place.

It was called Ewing Harbor in 1850 by McArthur, who anchored there during the first reconnaissance of this coast. But it is known only as Port Orford on this coast.

Cape Orford Bight.—From the southern extremity of Port Orford Head to the southwesternmost part of Cape Orford the distance is six and seven-eighths miles and the bearing north forty degrees west (N. 40° W.). The shore line between these two points is a long curve which recedes over three-quarters of a mile to the eastward at the mouth of Elk River. The extreme extent of the Port Orford Head is barely three-quarters of a mile, when the bold, rocky cliffs change to a broad, loose sand beach which reaches to the present mouth of the Elk River, four miles distant. The general features of the shore are a low, terrace-like formation, nearly two hundred feet high, with a few trees upon that part south of Elk River, and covered with forests north of it. In the details there is a large lagoon, emptying by a small mouth, just north of Port Orford Head; then a narrow, uniform sand ridge one and a half miles long and rising to one hundred and sixty feet elevation. It starts steeply from the beach, and is covered with grass, fern, sallal bushes, and a few pine trees. Behind this the land falls rapidly and forms lagoons and marshes which belong to the valley of the Elk River. The seaward face of this ridge is so steep that in places it breaks down and the uncovered parts present a yellowish appearance. The northern extremity of this ridge is squarely cut off and affords a notable landmark to those acquainted with the locality. To the northwestward of this ridge the shore is very low and is marked by a line of sand dunes for one and a half miles; through this valley empties the Elk River. Immediately behind the sand dunes are the forests. Thence to the cape the blue sandstone cliffs are nearly vertical, with a narrow sand beach at low water. The cliffs are about one hundred and fifty feet high and covered with trees to the edge, until within one mile of the cape where the forest retires from the shore. Immediately behind the cape the narrow neck of land breaks down and is very rough. The face of the cliff exhibits in certain lines of stratification vast numbers of marine shells in the hard sandstone.

Elk River.—This narrow stream, fordable at its mouth at low tides (1851–1853), rises in the barrier of high mountains behind the cape and Port Orford, but towards the coast it comes for miles through broad marshes formerly covered with pine and white cedar, and an almost impenetrable undergrowth. The mouth in 1869 opened only two and a quarter miles southeast of the cape, running northwestward for one mile close under the high cliffs, with only a low, narrow sand spit between it and the sea. In 1851–'53 it opened one mile farther to the southeastward, where the cliff begins and where the north side of the stream was under the grassy, sloping

hill-side. It must eventually break through again at the latter place. All material from the river is carried by the littoral current to the northwestward; and the formation of the long sand point clearly demonstrates the same course of movement.

The name of this river on Tebenkoff's chart of 1848 is Tituna. It received its present name from the settlers when we were there in 1851. At the mouth of the river there was found on the 18th of May, 1860, a bottle, nearly buried in the sand, which contained a memorandum stating that it had been thrown from the steamer *Brother Jonathan*, in latitude 42°, longitude 124° 50′, on the 23d of March of the same year, the wind at the time being strong from the south. It had traveled northward about fifty miles.

The Indian name for the Port Orford Head is Chim-tar-ten; and the name of the outlet of the lake behind it is Mus-yee-gi.

CAPE ORFORD, OR CAPE BLANCO.

When this cape was covered with trees its outline presented a great similarity to that of Point Concepcion (although the latter has no trees upon it), when it was made from the northward or southeastward, the more especially as the neck behind it is broken down, and then there are no trees for over half a mile inside the neck. Further inland are forests of pine upon gradually rising land. Since the erection of the light-house, however, all the trees on the cape have been destroyed, and it is now made from seaward as quite a small mesa of four hundred yards in extent and two hundred and eight feet above the sea, with the lower neck of one hundred and forty feet elevation to the eastward.

The extremity projects not more than one and a half miles from the general coast trend, although it is the westernmost point of land on this coast until we reach Cape Ayala, in latitude 48° 10′, nearly fourteen miles south of Cape Flattery.

When made from the northward the cape really looks like a moderately low, bluff shore islet, the more especially when the atmosphere is hazy over the low land behind it. The western face is three-eighths of a mile in extent north-northwest and south-southeast; and the neck immediately behind it is four hundred yards across. For three-eighths of a mile from the base of the cape towards the west-northwest the rocks are very thick. From one mile west half south (W. ½ S.) to one and a quarter miles southwest by south (SW. by S.) lie the dangers of the Blanco Reef. Between the Blanco Reef and the Orford Reef lies the one-mile-wide passage named the Orford Channel. The Orford Reef lies in an extended cluster of rocks and dangers from three miles southwest by south (SW. by S.) from the light-house round to four and a half miles south (S.) from the same point. These reefs and passage between them are described in detail further on.

The seaward face of the cape is a steep cliff of two hundred feet elevation. In different years and in different seasons its aspect varies. In October, 1885, we found nearly all the southern half of the cape bright in the afternoon sun. In May, 1886, there were very few patches of light color around its face, but at other times it has appeared bright through all the phases from whitish or yellow to dark gray. These phases depend upon the amount of vegetation growing on the steep sides of the cape and on the sunlight shining upon it.

Close under the southern side of the neck there rises a large, high, single rock about one hundred yards from the beach.

As seen broadly from seaward the cape is a wholly inconspicuous object on account of the high lands behind it. At ten miles it seems a mere change in the color of the long line of mesa land bordering the sea, and especially if the cliff is not showing bright. It is, however, easily recognized by those familiar with it, and especially by reason of the light-house and adjacent buildings.

LIGHT-HOUSE ON CAPE ORFORD (BLANCO).

This is a primary sea-coast light. The light-house is situated on the highest part of Cape Orford, from which the heavy trees were cut when the buildings were erected. It is nearly two hundred yards inside the western pitch of the cape. The tower is the frustum of a cone, and is built of brick painted white. The dome of the lantern is painted black. The keeper's dwelling is a two-story brick building, painted white, with green window blinds; it is situated about thirty five yards southward of the tower.

The light is *a fixed white light* of the first order of the system of Fresnel. It was first exhibited on the 20th of December, 1870, and shows every night from sunset to sunrise. The arc of

Orford Reef. Elk River.

N. by E., ½ E.

Orford Reef.
White Rock.
White Cliff.
Cape Orford Light-house, N. ¾ E., 15¼ miles.

Cape Orford Light-house, NE., 10 miles.
Orford Reef.

N. by E., ¼ E.
Cape Orford Light-house and Reef, NNE., 11 miles.

White Cliff.

Elk River.

ght-house,

Orford Reef.

iles.

E. ¼ S., 5 miles. Cape Orford Reef. Port Orford Head.

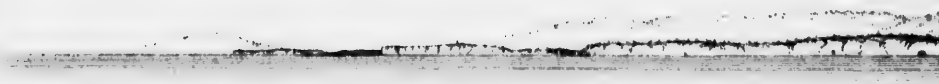
Sikhs River.

Castle Rock, 188 feet. Gull Rock, 118 feet.

Blanco Reef.

Pyramid Rock.

Cape Orford Light-house, NE. by E. ¼ E., 6 miles.



Blacklock Point.

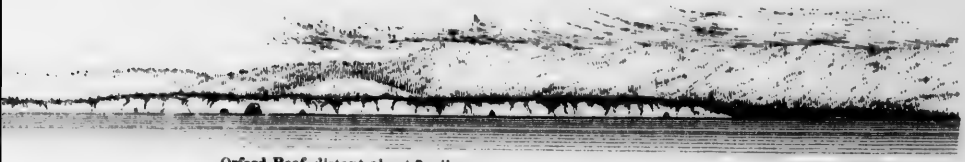
Cape Orford Light-house,
N. by E. ½ E., 11 miles.

Orf

Cape Orford Light-house,
North, 20 miles.

Reef.

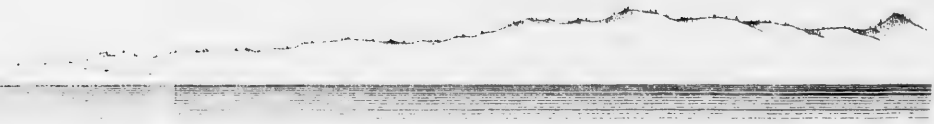
Cape Orford Light-house, N. by E., 12 miles (Cape lifted by mirage); smoky beyond



Orford Reef, distant about 8 miles.

Elk River Valley.

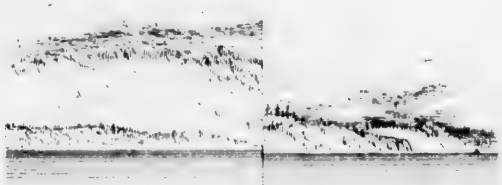
Port Orford Head,
N. by E. ½ E., 16½ miles.



oky beyond

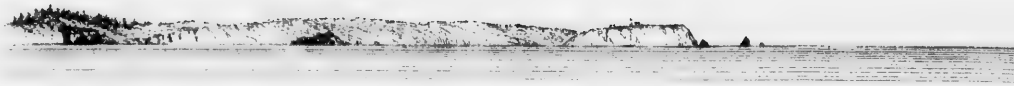
Sikhs River.
Castle Rock, 198 feet.

reh or Fin Rock.
Gull Roc ord Reef.



feet.

Bald Peaks, 3,0



Sikhs River.

Castle Rock, 188 feet. Gull Rock, 118 feet.

Pyramid Rock. Blanco Reef. (Very

Cape Orford Light-house, SE. ¼ S., 6¼ miles.

Bald Peaks, 3,056 feet.

Humbug Mountain. 1,877 feet.

Cape Orford, SE., 14 miles.

Point Orford Head.

Rock. Blanco Reef. (Very small and black.) Table. Arch or Fin Rock.
S., 6½ miles. Orford Reef.

Blacklock Point. Tower Rock, 126 feet.

e Orford, 14 miles. Point Orford Head. Orford Reef, SE. by S., 17 miles.

visibility over the water is two hundred and forty degrees; and the limit of visibility to the southward is tangent to Port Orford Head, which bears south forty degrees east (S. 40° E.), distant six and three-quarters miles. Thence it is visible round by the south, west, and north over the Orford and Blanco Reefs, to north twenty one degrees east (N. 21° E.), and therefore commands the entire northern coast so far as it can be seen. The southeastern limit of visibility is almost on the line of Port Orford Head and Island Rock, so that a vessel would lose the light just as she reached within a quarter of a mile of the west side of that islet.

The height of the focal plane of the lens above the base of the tower is fifty feet; and above the mean level of the sea it is two hundred and fifty-six feet, so that the light should be seen, in a favorable state of the weather, from a height of—

10 feet at a distance of 21.9 miles.
20 feet at a distance of 23.4 miles.
30 feet at a distance of 24.6 miles.
60 feet at a distance of 27.2 miles.

The geographical position of the light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	42	50	07′ north.
Longitude	124	33′	45 .6 west.
Or, in time	8h	14m	15s.0.

The magnetic variation was 19° 30′ east in January, 1885, and increases annually about 1′.4; but the limit of the easterly variation will be reached within probably ten years from that date.

From the light-house we have the following bearings and distances to prominent points on the coast:

Cape Mendocino Light-house	S. 22½°	E.	144 miles.
Humboldt Light-house	S. 26°	E.	125 miles.
Trinidad Head Light-house	S. 29½	E.	108⅞ miles.
Saint George's Reef, the proposed site for the light-house on the Northwest Seal Rock	S. 27	E.	60¼ miles.
Fox Rock, the southwest danger of the Orford Reef	S. 18¼	W.	5½ miles.
The Northwest Rocks of the Orford Reef	S. 26	W.	3 miles.
Cape Gregory Light; this bearing passes over Gull Islet, one mile north from Cape Orford	N. 6	W.	31½ miles.
Yaquina Head Light-house	N. 10¼	W.	11.2 miles.
Tillamook Rock Light-house	N. 13°	W.	187 miles.
Point Adams Light-house, Columbia River	N. 13¾	W.	203 miles.
Cape Disappointment Light-house	N. 14½	W.	207½ miles.
Cape Shoalwater Light-house	N. 15½	W.	233½ miles.
Gray's Harbor (proposed light)	N. 16½	W.	248 miles.
Destruction Island (proposed light)	N. 19¾	W.	289 miles.
Tatoosh Island Light-house, Cape Flattery	N. 21	W.	333½ miles.

THE ORFORD REEF.

This dangerous area is two and a half miles long, north and south, and one and a half miles wide, east and west. It lies five miles broad off the coast between Port Orford and Cape Orford, and is the most western danger between Cape Mendocino and Point Grenville. Vessels from the Strait of Fuca and the Columbia River bound south of Cape Mendocino must lay a course outside of this reef.

The reef consists of between thirty and forty high, rocky islets, low small rocks, and sunken rocks, generally rising from deep water and in some places marked by small fields of kelp. Between the reef and the shore there is a good passage about one mile wide between the eight-fathom lines. The general direction of the reef is south of Cape Orford Light; and its northern danger is two and a quarter miles south of the cape. Stretching out one and one-third miles from the cape towards the Orford Reef there is another reef, which contracts the passage to one mile. This latter reef is known as the Blanco Reef.

The Orford Reef may be considered a rather compact mass of rocky islets and rocks, with two outlying dangers off the southwest and northwest parts, the former one mile, the latter nearly half a mile distant. The massiveness of the islets of this reef at once suggests that the earliest Spanish navigators never made this landfall, or they would have noticed them.

When the large Table Rock is about one and a quarter miles distant, bearing east, all the islets seem equidistant from each other to the southward.

The *principal dangers* of the Orford Reef may be enumerated as follows: *Fox Rock*, a ... low, black rock, about nine feet high, always visible except when swept by a heavy swell ... always showing a break. It apparently leans over to the southeast. It is the southwester... rock, and lies one mile west by south half south (W. by S. ½ S.) from the southernmost part ... reef. It has thirty fathoms of water close alongside of it, and depths of twenty-eight to two-three fathoms hence to the reef. We passed inside of it in October, 1885. The rock is on the range through Arch Rock and West Conical Rock, and one and three-quarters miles south ... one degrees west (S. 51° W.) from the latter.

Fox Rock lies five and one-quarter miles south eighteen degrees west (S. 18° W.) from ... Orford Light, and six miles north eighty-seven degrees west (N. 87° W.) from Tichenor's Roc... Port Orford Head. From it Northwest Rock lies two and a third miles north eighteen de... east (N. 18° E.), and the Southeast Black Rock one and one third miles north seventy-three de... east (N. 73° E.). A vessel bound into Port Orford from Fox Rock would lay a course east ... south (E. ½ S.) to pass clear of Tichenor's Rock.

Fox Rock—Buoy.—A *second-class* automatic *whistling buoy*, painted *red* and lettered FOX ROCK in *white*, was established May 16, 1889, and moored in forty-three fathoms of w... southwest seven eighths south (SW. ⅞ S.), distant five-eighths of a mile from this danger.

The buoy is surmounted by a whistle that is sounded by the action of the sea; it usually gives twenty to thirty blasts a minute.

From the buoy the following bearings and distances of important objects are given:

Cape Orford Light-house	N. 20° E., distant 5⅞ miles.
Table Rock, Orford Reef	N. 35° E., distant 2¼ miles.
Arch Rock, Orford Reef	N. 47° E., distant 2¼ miles.
Tichenor's ff Port Orford Head	N. 88° E., distant 6¼ miles.

Pilots and masters of vessels are requested to notify the United States inspector of l... houses, at Portland, Oregon, if this buoy should drift or not work satisfactorily.

Southeast Black Rock is a small, black rock about ten feet above water, with a break ... upon it. It is the southernmost part of the dangers of the main reef, and has twenty fathoms of water not far from it. It lies one and one-third miles north seventy three degrees east (N. 73° E. from the outermost danger, Fox Rock, and there is a depth of twenty-three to twenty-eight fathoms of water between them. The Southeast Rock lies on the range of the west side of the West Conical Rock on with the east side of Table Rock, on a bearing exactly south (S.) and two-thirds of a mile from the former.

It lies four and a half miles south four degrees west (S. 4° W.) from Cape Orford Light; and four and three-quarters miles north eighty-one degrees west (N. 81° W.) from Tichenor's Rock.

The nearest danger to this rock is an extensive and heavy break one-quarter of a mile north sixty four degrees west (N. 64° W.) from it.

Heavy Break South.—Near the southern part of the reef, but inside the Southeast Black Rock, there is a very heavy break that has not been approached. It lies one-quarter of a mile north sixty-four degrees west (N. 64° W.) from the Southeast Rock, and one and one-quarter miles north sixty-eight degrees east (N. 68° E.) from Fox Rock. It is on the range from Cape Orford Light and the east side of Table Rock.

Steam-boat Rocks.—These are near the southwest part of the reef, and are so named because from certain directions, as when looking north, the two rocks partly overlap and look like a steam-boat. The southern rock is thirty-three feet high, and the northern one forty feet, with visible and sunken rocks between them, and an ugly reef to the west-northwest.

These rocks are crowded near to the West Conical Rock, and lie nearly on the range of that rock and Arch Rock. There have been no soundings around them, and there is no break between them and the Heavy Break near Southeast Black Rock, even in heavy weather. The higher Steam-boat Rock is only one-sixth of a mile southwest from West Conical Rock, and the lower rock one hundred and twenty-five yards south from the higher. The connected reef runs one hundred and fifty yards to the west-northwest. Nearly a quarter of a mile west half south (W. ½ S.) from the higher rock is a sunken ledge upon which the sea breaks.

West Conical Rock.—This rock lies in the southern part of the reef, and is one of the larger and higher islets of the group. Its general shape is conical; its diameter is about seventy yards, and its height one hundred and twelve feet. The highest part of the rock is on the northwest side.

It lies almost exactly south seven-eighths of a mile from Table Rock and one-third of a mile southwest by south (SW. by S.) from the peak of Arch Rock.

From Cape Orford Light it bears south five degrees west (S. 5° W.), distant three and one-fourth miles, and from Tichenor's Rock north seventy-four degrees west (N. 74° W.), distant four and seven-eighths miles.

There is a sunken ledge one hundred and twenty-five yards nearly east from the southeast part of the West Conical Rock. It consists of a cluster of sunken rocks with two or three small rocky points above water. There is deep water around this danger.

Flat Black Rock, low, and not over twenty-five yards in extent, lies one eighth of a mile northwest by west (NW. by W.) from West Conical Rock, and a quarter of a mile west by south (W. by S.) from Arch Rock.

Arch or *Fin Rock*.—This rocky islet is in the southern and eastern part of the group. It is the highest rocky islet, but not so massive as Table Rock. It is one hundred and fifty yards in extent, and rises to one hundred and forty-nine feet above the sea. It is nearly divided into two parts by a fissure north and south. When seen from the south and southwest it looks like a great pyramidal islet, much broken, with a large, somewhat square, arch through it. This arch is about three times as wide as it is high, and nearly one-third the width of the islet. From a distance of six miles the arch can hardly be made out, even with a marine glass. When seen from the east the southern face looks almost vertical, with irregular, sharp breaks on the north side. It is very like the great fin of the Orca when seen from the southeast.

There are no dangers close to Arch Rock on the north and east sides, and a depth of eight fathoms of water is found at two hundred and fifty yards distance to the eastward; but on the south and west sides, close under it, lie several sunken and visible rocks. Some small, black rocks, just above water, and some sunken ones, lie in a compact cluster nearly one-quarter of a mile south seventeen degrees west (S. 17° W.) from Arch Rock. They have ten fathoms of water close around them.

Arch Rock lies three and three quarters miles south five degrees west (S. 5° W.) from Cape Orford Light house, and four and three-quarters miles north seventy-two degrees west (N. 72° W.) from Tichenor's Rock.

From it the West Conical Rock lies one-third of a mile southwest by south (SW. by S.), and Table Rock three-quarters of a mile north fourteen degrees west (N. 14° W.). The Southeast Black Rock lies three-quarters of a mile exactly south (S.), and the Northwest Rock five-eighths of a mile north forty five degrees west (N. 45° W.).

Fox Rock is on the range of Arch Rock and West Conical Rock, distant one and seven-eighths miles south fifty-one degrees west (S. 51° W.) from the former.

About one-quarter of a mile to the eastward of Arch Rock, in six to eight fathoms of water, there is a line of kelp.

A sunken rock lies in eight fathoms of water one-third of a mile north sixteen degrees east (N. 16° E.) from Arch Rock; and a rock, visible at extreme low tides, lies one-third of a mile north six degrees west (N. 6° W.) from Arch Rock, and nearly in line to Seal Rock; and nearly midway between this latter danger and Seal Rock there is a small, black rock just above water. These last mentioned dangers lie nearer and to the eastward of White Conical Rock.

White Conical Rock.—This rock lies in the middle of the group; it is a small rock, about sixty feet high, nearly on the line between West Conical Rock and Table Rock. It lies nearly one-third of a mile north forty-one degrees west (N. 41° W.) from Arch Rock.

Flat Rock is a low rock, about forty yards in extent, lying on the line between Table Rock and Fox Rock, distant three-quarters of a mile from the former, and one and a half miles from the latter. It lies on the western limit of the group and there are no known dangers outside of it except the outlying Fox Rock. A quarter of a mile to the northeastward of it lie the sunken and visible rocks of the group.

Seal Rock.—This is on the eastern side of the group; it is a moderately large rock, fifty three feet high, generally resorted to by sea-lions. It lies nearly one-quarter of a mile south thirty degrees east (S. 30° E.) from Table Rock. It has dangers close under the west side; and two outlying dangers in the kelp to the eastward and northeastward. The first of these is a *sunken rock*, reported to break very seldom, and lying nearly one-quarter of a mile south eighty-three degrees east (S. 83° E.) from it; the other is a rock visible at low tide lying the same distance south thirty-seven degrees east (S. 37° E.).

Round Rock.—This is in the middle of the northern part of the group, and lies a quarter of a mile south thirty-four degrees west (S. 34° W.) from Table Rock. It lies in the midst of dangers. The line from Table Rock to Fox Rock, bearing south thirty-four degrees west (S. 34° W.), passes over Round Rock at one-quarter of a mile from Table Rock; a cluster of *sunken rocks* at a little more than half a mile; Flat Rock at three-quarters of a mile; and Fox Rock at two and a quarter miles.

Square White Rock.—This is in the northwestern part of the group; it is about sixty yards in extent and seventy-two feet high. It lies nearly half a mile south fifty degrees west (S. 50° W.) from Table Rock. There are no immediate dangers to the westward of it. The line from Table Rock to this rock passes just between two clusters of sunken rocks at nearly one-third of a mile from the former.

Long Brown Rock.—This rock lies on the western side of the group nearly half a mile south seventy-six degrees west from Table Rock; this bearing passes almost over a small black rock one-eighth of a mile from Long Brown Rock. This rock is one hundred yards in extent north and south and rises to seventy feet in elevation. It has seven to ten fathoms of water close around it, and no sunken dangers to the westward. Nearly one-quarter of a mile north fifty degrees west (N. 50° W.) from it, or towards the Northwest Rock, lies a small rock above water.

Large Brown Rock lies one quarter of a mile west (W.) from Table Rock. A field of kelp stretches from Table Rock past the north side of this rock and out to the small visible rock lying five-eighths of a mile west from Table Rock and nearly a quarter of a mile northwest half west from Long Brown Rock.

Table Rock.—This is the largest of the rocky islets of the Orford Reef group, and is very near the northern and eastern limit of the visible dangers. It is nearly circular and one hundred and fifty yards in diameter. It rises almost vertically to a rounding flat top, one hundred and forty seven feet above the sea, and presents a very massive appearance. It can not be approached in a vessel because there are sunken dangers near it.

It lies three miles south eight degrees west (S. 8° W.) from Cape Orford Light-house and five and one sixth miles north sixty-five degrees west (N. 65° W.) from Tichenor's Rock.

From Table Rock the principal rocks of the reef bear as follows:

Arch Rock	S. 15 E.	¾ mile.
West Conical	S. 3 E.	½ mile.
Fox Rock	S. 34 W.	2¼ miles.
Northwest Rock	N. 67 W.	1 mile.

The prolongation of the line through Arch Rock to the southward passes almost through a cluster of sunken and small visible rocks at one-quarter of a mile from Arch Rock.

The prolongation of the line to West Conical Rock to the southward passes through South Black Rock at five-eighths of a mile from the former; and the same line to the northward passes through foul ground in the kelp field with three fathoms of water in spots at five-eighths of a mile from Table Rock.

The line to Fox Rock passes over Round Rock at one quarter of a mile, a cluster of sunken rocks at a little more than half a mile, and Flat Rock at three-quarters of a mile.

The line to Northwest Rock passes over a cluster of sunken rocks, called the Heavy Ledge, midway between Table Rock and the Northwest Rock.

The dangers immediately around Table Rock are *two sunken rocks*, with four fathoms of water around them, at one-fifth of a mile northeast by east (NE. by E.); *a sunken rock*, visible at extreme low tide, at one-quarter of a mile east half south (E. ½ S.), with three fathoms of water outside it on the same bearing. A large body of kelp stretches two hundred and fifty yards eastward of these dangers.

There are *two sunken rocks* at one-third the distance between Table Rock and Round Rock southwest by south.

Immediately under the west side of Table Rock lies *Bird Rock*, and the only practicable place for landing is on this side abreast of Bird Rock.

From the northwest side of Table Rock a field of kelp stretches in the direction of North West Rock for one-fifth of a mile, in ten to eight fathoms of water, to envelope Large Brown Rock, and thence continues nearly west to the small black rock northwest from Long Brown Rock.

Table Rock was formerly known as Best's Rock.

Foul ground is found stretching three-quarters of a mile exactly north (N.) from Table Rock with soundings of only three and three and a half fathoms among a heavy field of kelp, which

marks the northernmost part of this reef. The steam-collier *Victoria* struck upon a rock in this foul ground in November, 1883, when coming through the Orford Channel from the northward, and was stranded near Port Orford to keep her from sinking.

This foul ground is two and a half miles south by west (S. by W.) from Cape Orford Light house, and five and a half miles north by west one-quarter west (N. by W. ¼ W.) from Tichenor's Rock. The northernmost part of it lies just one mile north seventy-two degrees east (N. 72° E. or E. by N. ⅝ N.) from the Northwest Rock. Therefore a vessel in entering or leaving the channel can know her proximity to this danger by this bearing and the range of Table Rock and West Conical Rock, with Arch Rock open to the southeast of that range. Another range is Klooquch Rock on with Tichenor's Rock.

Heavy Break North.—This rock lies midway between Table Rock and Northwest Rock, and is, with the exception of the latter rock, the northwesternmost part of the Orford Reef. When we passed within a mile of it we estimated it as showing four feet above water, and it always has a break upon it. The line of soundings running alongside of it shows ten and a half fathoms of water, over fine gravel, close under its eastern side, and no kelp.

There is *another sunken rock*, visible at extreme low tides, lying two hundred and seventy-five yards north of this Heavy Break; there is a depth of twelve fathoms of water close alongside of it. We did not see it break. There is no kelp around it, but a large line to the northward stretching from the foul ground east of Table Rock to within four hundred yards of the Northwest Rock.

This sunken rock is supposed to lie half a mile south eighty-two degrees east (S. 82° E.) from the Northwest Rock, and five-eighths of a mile north fifty-two degrees west (N. 52° W.) from Table Rock; but it is very doubtful if this danger exists.

Northwest Rock.—This small rock forms the northwestern limit of the Orford Reef. It is about sixty yards long, east and west, narrow, and has two slight heads on it. It is twenty feet above water, and has deep water all around it, although there are no soundings obtained very close to it, but it always shows a break around it. The depth of water one-third of a mile to the west is twenty-four fathoms over hard sandy bottom; and one-quarter of a mile to the north by west a depth of twenty-three fathoms is found; but between these there is a depth of only eleven fathoms, at one-quarter of a mile to the northwest. One-quarter of a mile to the east-northeast is the northwest limit of the kelp-field which stretches from north of Table Rock.

The Northwest Rock lies three miles south twenty-seven degrees west (S. 27° W.) from Cape Orford Light-house; and six and one-quarter miles north sixty-five degrees west (N. 65° W.) from Tichenor's Rock. From it Fox Rock bears south eight degrees west (S. 8° W.) distant two and one-third miles; and the "Heavy Break South" southeast of Fox Rock bears south twenty-four degrees east (S. 24° E.), two miles distant.

Fields of kelp lie in different areas from one mile east-northeast of the Northwest Rock to the north end of the foul ground already described as stretching north three quarters of a mile from Table Rock. The western and more straggling parts of the kelp are in sixteen fathoms of water; the eastern and more compact fields have five to three fathoms among them. But they are very dense, and it is possible that isolated bayonet rocks may exist.

Forty-seven dangers.—Although we have not described each individual danger, yet there are no less than forty-seven islets, rocks, and sunken rocks in the Orford Reef, even then only partly subdividing such smaller groups as the Steam-boat Rock. The compactness and massiveness of these dangers are marked features of the Orford Reef; any vessel approaching it in thick weather may be in danger when she has not less than thirty fathoms of water.

This group of dangers has been known as the Orford Reef since 1850. When coming down the coast in 1786 La Pérouse says his latitude at noon was 42° 58′ 56″, and that two hours afterwards he was abreast of nine small islands or rocks lying about a league off Cape Blanco, which bore northeast one-quarter east (true). He called them the "Isles Necker," evidently this Orford Reef group.

About two miles westward of the reef Tebenkoff gives a sounding in forty-three fathoms.

The Blanco Reef.—It is usual to consider the reef stretching out from the shore under Cape Orford southeastward towards the Orford Reef as distinct from the latter because the Orford Channel runs between them.

The hydrography off this cape has not been continued north of a line southwest half west from Cape Orford Light, on which the soundings are carried out to twenty-seven fathoms of water

at three and two fifths miles from the shore. The indications are that the line of ten fathoms surrounds the cape at a distance of one and a half miles from the light-house. Within this line are several dangers which are important as forming the northeastern boundary of the northern entrance to the Orford Channel.

Thirteen-feet Rock.—At nearly one and a half miles south thirty-five degrees west (S. 35° W.) from Cape Orford Light there is foul ground, with a sunken rock having only thirteen feet of water upon it. There is kelp a short distance to the north of it where the depth is five and a quarter fathoms, but none is marked to the north and southeast.

Nearly one-quarter of a mile north from this thirteen-feet rock, or in the direction of Pyramid Rock, and distant from it half a mile, lies a *sunken rock* which nearly always shows a breaker. The kelp lies between these two dangers.

About two hundred and fifty yards to the east-southeast of this danger there is a depth of three and three-quarters fathoms, but farther on the same bearing the depth increases to ten fathoms in a quarter of a mile. This thirteen feet sunken rock lies exactly on the range of the highest points of Table Rock and Arch Rock, of the Orford Reef, bearing south thirteen degrees east (S. 13° E.). It is distant two miles from Table Rock.

Rock.—A long, narrow, black rock lies one-quarter of a mile northeast by east (NE. by E.) from the thirteen-feet sunken rock. It bears south twenty-eight degrees west (S. 28° W.), distant one and one-quarter miles from the light-house; and south-southeast (SSE.) five-eighths of a mile from Pyramid Rock, which lies directly off the cape. The direction of the rock is north-northwest and south-southeast, pointing directly to Pyramid Rock. It is about one hundred and twenty-five yards long, and there is a patch of sunken rocks inside its southern end. A small field of kelp lies a quarter of a mile to the eastward of this rock, and there is a depth of six fathoms between them.

Pyramid Rock.—This danger as seen from the west-southwest is a sharp, pyramidal, black rock, estimated to be eighty feet high. The whole extent of the principal rock and the smaller ones, lying in a west southwest direction off its northwest point, is two hundred and fifty yards. It lies one mile broad off the cape and bears south sixty-three degrees west (S. 63° W.) from the light house. There are no visible rocks laid down outside of it, and no soundings have been obtained near it. Inside of it there is a line of visible and sunken rocks, lying north-northwest and south-southeast for half a mile, beginning one eighth of a mile eastward of its south point. Inside of these are patches of kelp and visible and sunken rocks.

Three-eighths of a mile south-southeast from Pyramid Rock is a small black rock; and on the same course, five-eighths of a mile distant, lies the long, narrow rock already described.

THE ORFORD CHANNEL.

This mile-wide passage lies between the outer Orford Reef and the inner Blanco Reef. In case of the eight-fathom lines it may be reckoned one mile wide in the narrowest part, except one mile east-northeast from Table Rock, where there are soundings showing very irregular bottom, from seven and seven and three-quarters to twelve fathoms of water across the channel.

The channel is not straight, but in the curving part the depth is thirteen fathoms; between the reef and the three-fathom line, under the shore to the eastward, the distance is two and one-half miles, and the depth of water six and one-half to twelve fathoms; and between the Orford Reef and Port Orford Head, a distance of three and one-half miles, the depth of water ranges from ten to twenty fathoms.

SAILING DIRECTIONS.

A vessel leaving Port Orford and passing half a mile outside of the Tichenor's and Klooqueh Rocks should steer from Tichenor's Rock north forty-seven degrees west (N. 47° W.) five and a half miles, when Cape Orford Light-house will bear north (N.), Table Rock south twenty degrees west (S. 20° W.), and the Northwest Rock north sixty degrees west (N. 60° W.); and the vessel will then be in mid-passage. At this position change the course to north seventy-one degrees west (N. 71° W.) and run one and three-quarters miles to clear all possible dangers off the Blanco Reef. At the change of course the depth of water is twelve fathoms; at the end of the course it is twenty fathoms.

Coming from the north a vessel must keep two miles outside the light house until it bears north fifty degrees east (N. 50° E.) and Table Rock south thirty degrees east (S. 30° E.), distant a

more than two miles; then haul in east by south three-quarters south (E. by S. ¾ S.) towards the highest part of the yellow bluff between Elk River and Port Orford Head. When the light bears north (N.) and the Northwest Rock bears southwest by west half west (SW. by W. ½ W.) steer southeast (SE.) five and a half miles to clear Tichenor's Rock half a mile.

A ship-master accustomed to run by ranges may make a straight course through the Orford Channel, as follows:

In coming up the coast southward of Port Orford, bring Cape Orford Light-house to bear northwest by north (NW. by N.) and keep it bearing so until the vessel is nearly one mile past the Klooquch Rock. This course will run within one-third of a mile of that rock, but there is plenty of water, over twelve fathoms, and no known sunken dangers. When almost one mile past Klooquch Rock the southern extremity of Tichenor's Rock should be on with the eastern extremity of Klooquch Rock; if they are not on, bring them on, and observe some point of the land to the southward of Humbug Mountain in range at the same time. Change the course to that range, which is north fifty-five degrees west (N. 55° W.), and run closely on it until Pyramid Rock of the Blanco Reef is on with the light-house, when you will be all clear of the reefs and may shape your course accordingly. On this range the closest approach to the dangers of the Orford Reef will be one-third of a mile on the port hand, when the long, narrow, black rock and the Pyramidal Rock of the Blanco Reef are in range; and the closest approach to the thirteen-feet rock of the Blanco Reef will be one-third of a mile on the starboard hand, when the light house is nearly abeam and Arch Rock shows to the westward clear of Table Rock and its neighbor Bird Rock.

After this range is once obtained it may be used also in running to the southward through this channel.

Even the larger steamers frequently go through this channel when bound northward during the heavy northwest winds and the large swell of the summer months, but it is unadvisable to do so in ordinary weather; and when the atmosphere is hazy or the fog is threatening to come in, a vessel should not attempt the passage. All the smaller coasting steamers go through the channel.

As a general direction to vessels passing through the channel, more especially applicable to sailing vessels beating through, this may be given: Keep to the eastward of all the kelp bordering the Orford Reef, and especially avoid the kelp in the northern limit of the reef because there is known to be three fathoms and possibly less in it when Table Rock and West Conical Rock are in range. The steam-collier *Victoria* is supposed to have struck in this patch. And care must be taken to avoid the dangers of the Blanco Reef where the kelp does not reach out quite so far as the sunken rock with thirteen feet of water upon it, the outermost known danger of that reef, and which lies on the range of the highest point of Table Rock and Arch Rock. Above all, keep out of the kelp, and if in an emergency a vessel should happen among it, run through any lanes of clear water that may be practicable rather than through the thick part of the field.

On the Coast Survey chart the passage is called the Steamer Channel, which was a provisional name adopted in the reconnaissance of 1853.

It is usually assumed that Martin de Aguilar, commanding the second of Vizcaino's vessels, reached the latitude of 43° where he found a white point, which he called El Cabo Blanco, where the coast begins to stretch to the northwest. There is no proof that he was in this latitude beyond the fact of his having sailed with a southerly wind northward of Redding Rock. It is more probable that he was not much higher than the latitude of 42°, and that he attempted to enter Smith's River or the Chetko; because he says that near Cape Blanco there is a large river with much water, deep, and having its banks covered with ash trees, willows, and other Spanish trees; and he was desirous of putting into it, but the currents prevented him. It is not very likely that he was as high as the Rogue River, because that dangerous reef would have made him prudently keep outside of it in southerly weather. No mention of such a river is made on Vizcaino's chart, which only goes to latitude 42°, and the important landmark of the Orford Reef is wanting.

In the voyage of the *Sutil* and *Mexicana*, in 1792, we have the coast-line from Mendocino to Cape Orford fairly well laid down on a small scale, with the important reefs in good relation. This chart designates the cape as C. Blanco de Martin de Aguilar.

In the second expedition of Don Bruno de Heceta, in the *Santiago*, in 1775, he mentions that in latitude 43° there were "ten small islets distant one and a half leagues from the land, together with many sunken rocks." In this expedition the schooner *Felicidad* (*Sonora*) was separated from

the frigate, and Don Juan de la Bodega y Quadra describes the cape as an abrupt table projecting into the sea and marked by white patches, with a number of "Farallones" lying to the southwest of the cape. He says it is the Cabo Blanco of Aguilar, and El Cabo Diligencias (of Bellini's chart of 1756 and 1766).

The name Orford was given by Vancouver in 1792, and he placed it in latitude 42° 52'. On the western coast this name is the more generally used.

Duflôt de Mofras on his chart calls it C. Blanco de Aguilar, Diligencias, or Orford (1841

Fifteen miles west by north from Cape Orford La Perouse states that he had soundings in seventy-five fathoms.

We first visited the cape in 1851 to select a position for the light-house, and in 1853 we located the principal islets of the reef. In 1869 a special chart of this region was published by the U. S. Coast Survey.

The views from different directions clearly exhibit the characteristics of the reef islets, and also the peculiarities and relation of the cape to the mainland.

DEEP-SEA SOUNDINGS OFF CAPE ORFORD.

These soundings were made by the U. S. steam-ship *Tuscarora* on the 24th and 25th of October, 1873.

Distance and bearing from Cape Orford.	Latitude.	Longitude.	Depth (fathoms).	Temperature at bottom (Fahrenheit)	Character of bottom.
Miles.					
32 N. 80 W.....	43 07	125 14	1,270	35.5	Clay and mud.
39 N. 84½ W.....	43 08	125 24	1,692	.....	Clay, mud, and specks of black sand.
56 N. 88½ W.....	43 10	125 46	1,684	.....	
108 S. 83 W.....	43 12	127 00	1,698	34.8	Brown ooze, with particles of sand.
160 S. 83 W.....	43 24	128 10	1,667	.....	Yellow brown ooze.

The Davidson Inshore Eddy Current.—The *Dawn*, a steam-launch (running from Astoria to Hwaco) was towed to near Cape Orford, where she was cast off, and then drifted northward in the Davidson Inshore Eddy Current to the Alseya River, a distance of ninety-five miles.

THE COAST NORTHWARD OF CAPE ORFORD.

General features.—From Point Boneta to Cape Mendocino the extent of the shore-line is two hundred and twenty-three miles; and to Cape Orford three hundred and eighty miles. At Cape Mendocino the great range of mountains coming from the southeast breaks immediately upon the coast-line. The mountains from the northeast do not reach the coast so low down as the cape, and there is a broad valley near the shores occupied by Humboldt Bay, Eel River, Mad River, etc. Thence northward the mountain masses come close upon the coast in heights from three to more than four thousand feet. These mountains have generally forests to their summits; all the valleys are heavily wooded. In the latitude of Point Saint George the coast mountains are again pressed eastward to form the flanking masses of the Siskiyou Range, which reaches an elevation of over seven thousand feet at less than thirty miles from the coast-line. All these peaks are recognized by the navigators as landfalls, but their geographical positions are not yet known.

Thence to Cape Orford the ranges are badly broken, but they press upon the shore in high, wooded crest-lines of two thousand to three thousand feet elevation. Northward of Cape Orford the appearance and nature of the immediate coast-line assume a marked change. There is a general break-down in the coast mountains, made more prominent by the high, massive mountain range behind the Orford Bight. We reach long lines of high, bright sand dunes, backed by low, pine-covered hills with gentle slopes. The lines of sand dunes are broken by bold, rocky headlands of moderate height. On the sea face and the southern sides of many of these prominent capes trees do not grow, and they present a bright, lively green of fern, grass, and bushes. The mountains behind these are not so high as to the southward, and they have even less regularity of continuity among them. The forests are very dense through valley and over mountain.

The general line of the coast is very straight, and the rocky heads obtain prominence almost wholly on account of the low, sandy shores on each side of them. A marked feature thence to the

Columbia River is the absence of outlying dangers, such as reefs, islets or islands, beyond the immediate shores. The rocky islet outstanding the farthest is Tillamook Rock, one and one-quarter miles off Tillamook Head; but that danger is now marked by a light house and fog signal.

From Cape Orford to Cape Disappointment, a distance of two hundred and eight miles, the coast is remarkably straight, in no case retreating more than eleven miles to the eastward of the line joining them, and that is about sixty miles to the northward of Cape Orford.

Northward of Cape Orford the shore-line trends a little east of north for ten miles, and then runs to the north-northwest for twenty one miles to Cape Gregory. For three miles beyond Cape Orford the coast-line is composed of high, rocky cliffs, broken by the entrance of Sikhs River, and bordered by rocky islets. Beyond that are sand dunes lying in front of a long, narrow lagoon opening on the ocean eight miles north of the cape.

Sikhs River.—This is a small stream one and three-eighths miles north twenty degrees east (N. 20° E.) from Cape Orford Light-house. It is not more than fifty yards wide at the mouth, which opens between sand spits directly abreast of Castle Rock. The south spit is composed of sand dunes reaching over sixty feet in height and running over half a mile towards Cape Orford; the north spit is short, and close under the high point, which is two hundred feet above the sea and covered with trees a short distance back. Inside of the mouth the stream widens to a reservoir area of over three hundred yards in diameter and then narrows through low grounds which are heavily wooded. Its course is nearly east and west for over fifteen miles. In 1869 the channel passed to the south of the rocky ledge and sand ridge stretching from Castle Rock to the shore. A saw-mill for manufacturing cedar lumber is being constructed a short distance from the mouth of the river, which flows through valleys covered with vast areas of the celebrated Port Orford cedar; and it is intended to build a railroad hence to Port Orford to transport the lumber for shipment.

The river is usually known as Sixes River; in 1851 it was called Sikhs River, the Chinook "jargon" name for friend. The Indian village upon the Sikhs was called the Te-che'h-quut, and their name for the stream is Sæ-quæ-æ-me.

Gull Rock.—This is a rocky islet lying one mile north (N.) from Cape Orford Light-house. It is very irregular in outline, three hundred yards in extent, and, as seen from the westward, presents a black, jagged sea-face, with the summit marked by two knobs; the principal one, at the southern part, is the higher and reaches one hundred and eighteen feet in height. There are rocks and dangers close around it, and between it and the shore. A cluster of sunken rocks lies a little less than half-way towards the northwest part of Cape Orford.

Castle Rock is a rocky islet lying three hundred yards off the mouth of the Sikhs River, and one and a half miles north by east (N. by E.) from Cape Orford Light-house. It is two hundred yards in extent and rises abruptly to a height of one hundred and eighty-eight feet. The surface is broken by two or three irregular knobs; when seen from the northwest the northeast face overhangs slightly. There are eight or ten low rocks near and around it, besides many sunken rocks. The farthest outlying rock is three hundred and fifty yards to the southwestward.

This rock is quite distinctly made out from ten or twelve miles to seaward on account of its black front breaking the white line of dunes and sand beach.

There has been no hydrographic survey made in the vicinity of Castle Rock and Gull Rock.

Blacklock Point.—This is the precipitous, rocky point three miles north two-thirds east (N. ⅔ E.) from Cape Orford Light-house. The cliff is about one hundred and ninety feet high, with a sharp point jutting out about three hundred yards. This sharp point is high and its base is bordered by many rocks stretching out toward Tower Rock and beyond, with many rocks and dangers on its south side. On the north side of the cliff-point there is a very deep, narrow ravine. There are no trees on top of the cliff for several hundred yards back; but two or three buildings, appearing as a large, bright, low house, are seen from seaward apparently just southward of the cliff point, but in reality they are on the cliff three hundred yards north of the point.

The cliffs to the north of the point are formed of a very fine grained lead-colored sandstone, suitable for building purposes, now being quarried.

The shore-line between Sikhs River and this point is a narrow line of sand dunes, averaging twenty feet in height, and a rather broad low-water sand beach. The bluffs rise behind this to two hundred feet, with a moderate slope, showing quite green; and a notable feature along this short stretch of shore-line is the forest of pines, half a mile in extent, north and south, on the slope of the table-land, and coming down to forty feet above the water.

Blacklock Landing.—Off Blacklock Point there is a line of high and low rocks extending in a curved line to the southwest for nearly three-quarters of a mile. The line is narrow and not continuous. For three hundred yards from the point the masses of rock nearly touch one another and rise to points of one hundred to eighty feet in height. *Tower Rock* is the highest and principal islet in this reef. It lies two and seven-eighths miles north (N.) from Cape Orford Light house, and six hundred and seventy-five yards south sixty degrees west (S. 60° W.) from the extremity of the point. It is ninety yards in extent and one hundred and twenty-six feet elevation. There are two rocks between it and the *Three Sisters*, of which two are pyramidal rocks, about forty feet high, at the outer end of the compact reef, with six fathoms of water reported under their south side. Outside of the Tower Rock is a rock sixty yards in extent and about twenty feet high, distant nearly half a mile south by west half west (S. by W. ½ W.), with another, about fifty feet in height, only two hundred and seventy five yards south southwest (SSW.) from Tower Rock. Three hundred yards from Tower Rock, and bearing west-northwest (WNW.) from it, is a small rock about twenty feet high. Three-quarters of a mile southward from Tower Rock there is a rock thirty yards in extent and about twenty feet above the sea. It lies slightly nearer Castle Rock than Tower Rock and just outside of the line from the latter to Gull Rock.

There is said to be not less than ten fathoms of water outside of Tower Rock and its outlying neighbors. Inside of it and between the Three Sisters and the *Twin Rock*, twenty-five feet high, and lying half way between the former and Tower Rock, is a narrow passage of less than one hundred yards in width, and reported to have six fathoms in the middle. There is also a passage with six fathoms in it, to the westward of the Twin Rock, between it and a low rock, about fifteen feet high, lying midway between Twin Rock and Tower Rock.

In the bight formed by this curved reef lie two *sunken dangers*. One consists of two sharp points of a rock lying three hundred yards south forty-three degrees east (S. 43° E.) from Tower Rock; the other and inner one, bare at extreme low tides, lies two hundred and sixty yards south eighty-two degrees east (S. 82° E.) from Tower Rock. These sunken rocks are reported to have seven to eight fathoms of water around them. It is understood that both these dangers will be destroyed by dynamite.

A wharf, two hundred and thirty-three yards long, has been carried out from the middle of the south side of the extreme point over the rocks towards Tower Rock. At its extremity it is twenty-seven feet above the sea, and vessels are to be loaded from two s[illegible]teen-ton cranes. Vessels lie at or near the wharf, heading to the southwest, in three and a h[illegible]homs of water. From the wharf a railroad is carried across the deep gulch over a bridge, ...[illegible]ence along the face of the cliff for three hundred or four hundred yards to the northward to the stone quarries. Inside the loading berth the dangers are thick and unavoidable. About one hundred and fifty yards to the east-southeast of Tower Rock there is placed a heavy mooring-buoy in seven fathoms of water.

One vessel was loaded from a wire cable stretched from the top of the cliff to a thirty-feet high rock lying two hundred and fifty yards from the cliff and directly east of Tower Rock. She was moored inside the rock in three and a half fathoms of water. Although it is claimed that this anchorage is good, it can only be relatively so among hazardous places; for if a vessel is disabled here and goes ashore there is no hope of saving her. A photograph of the wharf from the point indicates that it is a firm structure, founded among the rocks.

On the Coast Survey Chart of Cape Orford and reef this point is called Rocky Point.

Northward of Blacklock Point the shores are continued as a bare cliff of about the same height as to the south for some distance; then it runs into sand dunes behind which is a line of narrow lagoons; into this empties Flores Creek. The opening of this water is about eight miles north of Cape Orford.

COQUILLE RIVER.

From Cape Orford Light to the mouth of the Coquille River, in latitude 43° 07′, the course of the coast-line is almost exactly north (N.) for eighteen miles, with a slight curve of two miles to the eastward about midway. Along this shore the soundings range from seven to fifteen fathoms at the distance of one mile from the beach. Northward of Flores Creek the line of sand dunes continues to the Coquille, rising apparently to a height of seventy feet in some places. Behind these the country is comparatively low and heavily wooded, for the main stream of the Coquille

comes in from the northeast where it nearly reaches the south fork of the Koos River. There are lines of burnt forest visible a short distance inland.

The landmark for the entrance of this stream is the moderately high and partially wooded headland forming the south point of the entrance. The north point is a long, low, narrow spit of dreary sand dunes covered with heavy drift logs, and which naturally varies its shape, extent, and position, according to the force of the winter storms. The south point is a rocky bluff from sixty to one hundred feet high, but generally it is bordered by a narrow line of sand dunes.

On the north side of the south point, near the edge of the bluff where it is about one hundred feet high, are two or three high, rocky, outcroppings or buttes rising above the general level of the table land. The highest of these is locally known as *Gibraltar* and rises about one hundred and sixty feet above the sea, or sixty feet above the bluff. It is used as a lookout seaward from which to ascertain the condition of the bar.

Outside of the line of sand dunes of the south point there is a cluster of rocks or rocky islets, the highest nearly as high as the cliffs. The outermost is about half a mile from the shore.

The outer high rocks off the south point of the entrance to the Coquille River bear from Cape Orford north two degrees west (N. 2° W.), distant seventeen and one-third miles, and the Coquille Break bears north six degrees west (N. 6° W.), distant eighteen and one-third miles. In that distance the recession of the shore to the eastward is only one and a half miles about midway.

The Blacklock cliffs, about one and a half miles in extent, vary in height from one hundred and fifty to forty feet, decreasing to the northward. Northward of these bright cliffs there is a stretch of nearly eleven miles of low, sandy beach; then two and a half miles of broken, irregular cliffs to the south point of the Coquille entrance. The low, sandy shore has long, narrow lagoons behind it as if a wave of sand separated them from the sea; behind the lagoons the land is covered with trees, and rises gently to one thousand feet elevation in two or three miles. This beach varies in character; at times it is broad, hard and smooth, at other times it is steep, rough, and soft.

In 1887 *Flores Lake*, one hundred to eight hundred yards wide, three and a half miles long and heading just behind the north end of the Blacklock cliffs, had no outlet.

New Lake, one mile long, just inside the beach, had no outlet; its north end is nine and two-thirds miles northward of Cape Orford. On the inside of the lake, two miles from the beach there is a store, hotel, blacksmith shop, and post-office, known as "New Lake."

Another long and narrow lake just inside the beach is two miles long; the north end is thirteen miles from Cape Orford; the lake has no name. At fourteen and two-thirds miles from Cape Orford there is a small mouth of a very narrow lagoon one mile long; it has no name.

COQUILLE POINT.

Two miles south of this point is the first high, rocky islet, sixty feet above the sea and connected with the beach by rocks and foul bottom. Between this rock and the point there is another line of beach two-thirds of a mile long, through which breaks Johnson's Creek.

The Davidson Inshore Eddy Current has brought redwood drift logs and trunks of trees along the line of beach between Cape Orford and Coquille Point.

The three miles of shore southward of the entrance to the Coquille River is a bluff headland ranging in height from forty to one hundred feet. The country behind is comparatively flat and is covered with trees, with small grassy openings. The shore-line is broken and irregular, and is bordered with rocks that extend as far out as half a mile. There are a number of settlers' houses, generally painted white, scattered along the edge of the bluffs.

The point itself is fifty to sixty feet above the sea, with several large outlying rocks reaching sixty five feet elevation. Back from the shore are the usual pine trees. Above the general surface, and above the trees, rises an abrupt rocky butte named *Tupper's Rock* to an elevation of one hundred and fifty-five feet above the sea. It is near the south shore, inside the entrance to the river, and is a very prominent land mark. It was formerly known as Gibraltar.

Off the point several smaller rocks extend beyond the larger and higher ones; and some sunken dangers.

About a-quarter of a mile outside the visible rocks there is a *sunken rock*, visible at extreme low tides; and at an estimated distance of one-quarter of a mile west-northwest (WNW.) from this danger there is another *sunken rock* on which the steam-ship *Oriflamme* struck in 1869.

Coquille River Reef.—About one mile west-southwest from the extremity of the rocky cliff on the south side of the river entrance there are two rocks awash. These are doubtless a continuation of the high rocky masses off the point.

But outside this danger and to the northwestward there is a sunken rock upon which the sea breaks very seldom, and only when there is a large swell from the southwest. This danger lies on the prolongation of the present jetty at the south side of the river, and a little more than one and five-eighths miles from its seaward extremity. The character of the beach and the direction of the swell suggest that the rock has a vertical face to the southwest, and that it is sharp at right angles thereto. During the heavy swell the water was disturbed between the rock and the shore, as if there was a deep ledge between them.

From Tupper's Rock on the south point, this hidden danger lies north eighty-five degrees west (N. 85° W.), distant one and seven-eighths miles; and from the two rocks awash off the south point it lies north thirty-eight degrees west (N. 38° W.), distant one and one-eighth miles.

This danger has been named the *Coquille Rock.*

Coquille Rock—Buoy.—On the 19th of May, 1889, a *first-class nun-buoy*, painted red and lettered **COQUILLE** in *white* was moored in fourteen and a half fathoms of water about two hundred yards west-northwest from the break on the Coquille Rock.

From the buoy the jetty is seen end on and bears east one-eighth south (E. ⅛ S.), distant one and eleven-sixteenths miles. The rocks awash off the south point bear southeast three-quarters south (SE. ¾ S.).

The geographical position of Tupper's Rock, as determined approximately by the U. S. Coast and Geodetic Survey, is:

Latitude	43	06	43	north.
Longitude	124	24	21	west.

The magnetic variation in January, 1885, was 19° 40′ east, with a yearly increase of 1′.6.

Landfalls.—Inside the coast-line between Cape Orford and the Coquille River there are two high peaks within reasonable distances as landmarks in fair weather. *Saddle Peak* is wooded and rises to twenty-six hundred and seventy-five feet elevation; it lies north fifty-eight degrees east (N. 58° E.) ten and a quarter miles from Cape Orford Light house. Nearer the coast is *Summit of Ridge*, covered with forest and twenty-four hundred and eighty feet above the sea. It lies north fifty-four degrees east (N. 54° E.) seven and two-thirds miles from Cape Orford Light-house. To these may be added *Bald Ridge*, eight miles north twenty-eight degrees east (N. 28° E.); *Round Top*, nine and a half miles north thirty-one degrees east (N. 31° E.), and *Dead Tree Ridge* only two and a half miles behind the shore-line and twelve and a half miles north fifteen degrees east (N. 15° E.) from Cape Orford Light-house. Dead Tree Ridge is seven miles southeast by south (SE. by S.) from Coquille Point.

In 1887 *the jetty* running out from the south point of the Coquille entrance was out one hundred and thirty yards from high-water mark to get ten feet depth at the extremity; but shoaling had taken place and there was then only a depth of five feet.

In December the heavy southeast gale carried away one hundred feet near the middle section.

Rackliff Rock is twelve feet above high water.

Bandon, on the side of the river just inside the entrance, is a small town of about twenty houses; two miles southeast of the town there is a small saw-mill with a capacity of cutting eight thousand feet of lumber a day.

Randolph has eight or ten houses; it is situated five miles from the mouth of the river, on the right bank.

Parkersburg has about fifteen houses; it is situated on the left bank of the river about seven miles from the mouth, and has a steam saw-mill with a capacity of thirty thousand feet a day.

Coquille City is a town of five hundred inhabitants; it is situated on the right bank of the river about twenty-three miles from the mouth. It is connected by road with Koos Bay, and has a daily mail and stage.

Changes, etc.—The opening of the river was never the same during consecutive seasons. In 1851 the northern sand point stretched southward and ended at these rocks, so that the channel ran between them and the bluff shore, and there was only three feet of water on the bar. In the winter of that year the boats of the steamer *Sea Gull* could not cross the bar, but effected a hazardous landing under the protection of the rocks. Subsequently boats were brought up from Port Orford by land in order to explore the river. In the hydrographic reconnaissance of 1859 the

mouth of the river had moved bodily to the northward and opened seaward to the north of all the rocks except the *Rackliff Rock*, which had previously been among the dunes and was then at the extremity of the north spit. There was but three feet of water on the bar.

In 1880 the Government engineers developed a plan for giving stability to the channel and increasing the depth on the bar to ten feet of water. It is proposed to carry a half-tide jetty directly west from the inside south shore nearly three-quarters of a mile from the outer south point, thereby throwing the water directly across the old south spit and avoiding all the rocks of the reef outlying the south shore and south head, and leaving the RACKLIFF Rock, two hundred and seventy yards to the north, as the extremity of the north point. About five hundred and ten yards of this jetty has been built, and the depth of the water on the bar has increased to a little over five feet. The width of the entrance will be about two hundred and fifty yards, against three hundred yards in the reconnaissance of 1859.

Inside of the entrance the river spreads out to the width of half a mile at high water; but at low water the channel is not over two hundred yards wide, and it runs for two miles nearly parallel with the shore and immediately behind the sand dunes. The deepest water on the bar is during the winter months; during the dry season the scouring of the river is not so effective. In March, 1887, there was reported to be a depth of about ten to twelve feet of water on the bar at high water.

The improvements of the mouth led to a regular traffic, and in the seasons of 1883, 1884, and 1885 one hundred and sixty-six coasting vessels entered the river. One of these vessels had a capacity of 150,000 feet of lumber. Several schooners of one hundred tons have been built there, and two large saw-mills have been erected on the river, one of them six miles from the mouth and the other fourteen miles. The river is navigated by light-draught boats for forty miles; small coasters ascend twenty-eight miles. The valley is very productive; the forests contain fir, white cedar, oak and myrtle.

The Coquille River is in the collection district of Southern Oregon; Empire City, on Koos Bay, is the port of entry.

When a vessel is a little to the northward of this river the white houses of the village of Bandon, on the left bank of the river, about one-quarter of a mile from the entrance, are visible on the northerly slope of the hill near its base.

In 1854 the miners were engaged in washing the auriferous sand and gravel at the back of the beach under the bluffs.

In approaching this part of the coast in 1854 we encountered a very heavy swell, with the water changing to a dark-brown color; and after passing through it the vessel tacked off shore, hove to, and sounded near its outer limit, but found no bottom with eighty-four fathoms of line.

It is reported that a sunken rock lies two miles west (W.) from the mouth of Coquille River and that the sea breaks upon it in rough weather. The distance may be overestimated, but the bearing is probably reliable. It may refer to the sunken rock already mentioned upon which the *Oriflamme* struck in 1869.

The approximate geographical position of the entrance to the Coquille is:

Latitude	43° 07′ north.
Longitude	124° 24′ west.
Or, in time	8h 17m 36s.

The magnetic variation was 19° 45′ east in January, 1885, with an annual increase of 1′.2.

Tides.—The approximate Corrected Establishment, or mean interval between the time of the moon's meridian transit and the time of high water, is XIh 42m, and the mean rise and fall of the tides is four and four-tenths feet. The difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1h 22m for high water and 0h 40m for low water. When the moon's declination is greatest these differences become, respectively, 2h 12m and 1h 28m. The heights of these tides differ one and a half feet for high water and two and a half feet for low water, and when the moon's declination is greatest these numbers are two and a half and four feet, respectively. These quantities are deduced from the observations at Port Orford.

To find the times and heights of each tide throughout the year consult the Pacific Coast Tide Tables published annually by the U. S. Coast and Geodetic Survey.

For the required tides take out the numbers for high and low waters at Astoria, and from the given time of high water subtract 1h 03m and from the height subtract two feet; from the given time of low water subtract 1h 07m, and the given height needs no correction.

The bearings and distances to prominent objects from the mouth of the river are as follows:

Cape Orford Light-house	S. 3° E.	18 miles.
Fox Rock, of the Orford Reef	S. 2° W.	22¼ miles.
Cape Gregory Light-house	N. 9° W.	13¼ miles.

The Indian name of the river is Koh-kel'.

La Pérouse in 1786 passed down the coast, in moderately thick weather, south of Tillamook Head, and when he approached Cape Orford he placed on his chart Cape Toledo about ten miles north of Orford. There is no such head in that situation, and the nearest point is the south head of the Coquille.

Tebenkoff on his chart of 1848 calls it Cape Toledo.

Off the line of coast between the Coquille River and Cape Gregory there is one sounding of twenty fathoms laid down nearly two miles from the shore about half-way between the two points named.

COAST NORTH OF THE COQUILLE RIVER.

For four miles north of the river there is a sandy beach backed by sand dunes that stretch inland from one-half to one mile to the edge of the forest.

Five-mile Point.—At six miles north seven degrees west (N. 7° W.) from the river there is a small point of rocky cliff about sixty feet above the water, with a cluster of rocks ten to forty feet high extending out one-third of a mile. This point is five and a quarter miles southeast from Cape Gregory. The cliffs extend for nearly two miles south of the point to the Coquille dunes. The small stream emptying about half a mile south of the point is called Whiskey Run.

The small coasting steamers, when bound northward in heavy summer weather, hug close around the rocks off Five mile Point and keep outside of a small, low, black rock, bare at low water, that lies just one mile to the north-northwestward of the outer part of the reef. This lone rock, which is half a mile off the shore, has a sunken danger two hundred and fifty yards inside of it to the east-southeast. It shows a break only at low water.

From Five-mile Point northward the shore-line falls back very little, and is formed by high, rough cliffs, forty to eighty feet above the water and wooded to their edges, which are broken down by three small streams in the first three miles. Each stream has a settler's house near the mouth. Then for two miles to the cape the cliffs are steeper, higher, and rougher, and wooded; this line is broken by the "Seven Devils" (for description of which see Cape Gregory). The cliffs range from one hundred to two hundred and fifty feet high, and the hills behind them rise to over five hundred feet elevation, and are covered with dense forests of fir and a very thick under growth. The shore is bordered with rocks of all shapes and sizes.

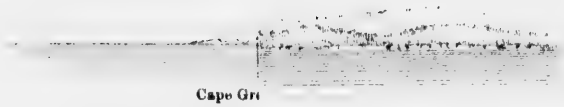
South Cove.—Just under the southern point of Cape Gregory there is a moderately deep cove, surrounded by high, rocky cliffs, but having a sandy beach at the northernmost shore. It is broad open to the south southeast, but is protected on the west by a narrow high point from which extends to the southwest a ledge three hundred and fifty yards long. In the eastern part of the cove there is a ledge parallel with the east shore, and restricting the width of the cove. The breadth available at the entrance to the cove is about two hundred yards. We do not know the depth of water in this cove or the character of the bottom but the opposition steam-tug used it as an anchorage in summer.

When the Coast Survey party passed around it in 1887 the water in the cove was so smooth that a landing could have been made with a skiff in perfect safety.

CAPE GREGORY.

The northern extremity of this headland lies thirty-one miles north six degrees west (N. 6° W.) from Cape Orford Light-house. The highest part of the cape is just visible above the horizon when a vessel is ten miles north of Cape Orford, with a wooded ridge running to the southeast from it. East of the first gap in this ridge the large pine trees stand up isolated as if they were the remains from some great forest fire. When the atmosphere is clear the crest-line is of nearly uniform height around to the Coquille.

The cape projects but a mile or two from the general straight line of the coast between Cape Orford and the Columbia River, and is one of the rocky hills which break the general line of the low shore which is so generally marred by sand dunes. There are no high mountains behind it, and therefore it is somewhat conspicuous. When the mountains in the interior are hidden by



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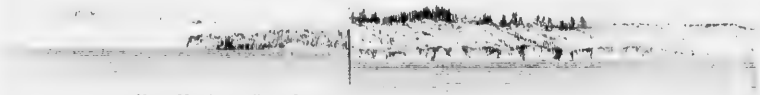
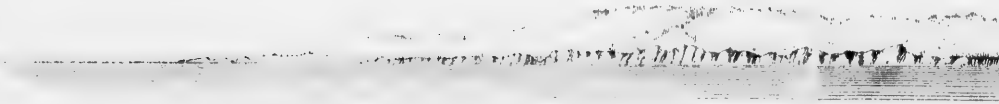


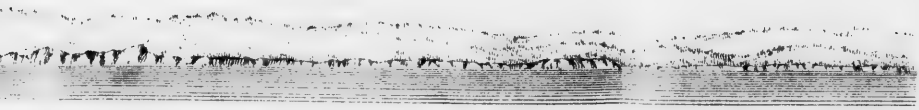
Koos Head. Cape Gregory

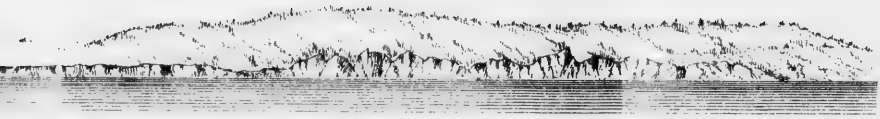


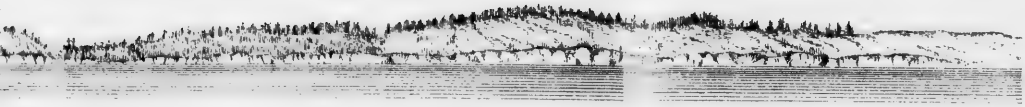
Cape Gregory Light-house, NNE., 13 miles.

Koos Head. Cape Gregory, NE. by E. ½ E., 8 miles.

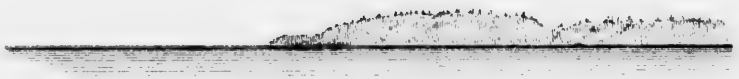
Koos Head. Cape Gregory Light-house, E. ¼ S., 8 miles.







Coquille Point and Reef, NE. by E. ½ E., 7 miles. South side of Entrance to Coquille River.



Cape Gregory, N. ½ E., 18 miles.
(Light-house not visible.)

Cape Gregory Light-house, NE. by N. ½ N., 11 miles.

clouds, fog, haze, or smoke, which also dim the lower intervening country, this headland stands out very markedly.

The coast line between Cape Orford and Cape Gregory makes a flat bow which bends eastward two and one-eighth miles just south of the Coquille River.

The bearing of the outer cliff of Cape Gregory from Cape Orford Light-house is north six degrees west (N. 6° W.) and the distance twenty-eight and three-quarters miles. This line passes just outside the Coquille Break at seventeen and three quarters miles.

The small rocky point five and a quarter miles south twenty-two degrees east (S. 22° E.) from the cape has been called Five mile Point for reference. The deepest indentation between it and the cape is at two miles from the latter, where the seaward face of this head may be said to begin and extend thence nearly to the light-house, a distance by the shore of four and two thirds miles.

The outermost part of the cape is less than half a mile long north-northwest and south southeast, with rocky cliffs fifty to one hundred feet high, sparsely wooded to their edges. Behind the cliffs it rises in somewhat irregular slopes to an estimated height of two thousand feet, two miles back.

Immediately off the cape for nearly half a mile are visible and sunken rocks which form a barrier nearly a mile long towards the northwest. The main ledge is low and is a perfect, narrow barrier, nearly half a mile long stretching to the north-northwest, against which the southwest swell of the winter storms breaks fiercely and magnificently. From the outermost point of the cape to the light-house the distance is two and a half miles north six degrees east (N. 6° E.). This part of the shore is formed by jagged, broken cliffs from seventy to one hundred feet high, surmounted with trees a short distance in from the shore. There is a small cove with a fine beach inside the ragged reefs near the northern part of the shore where small boats that know the locality may enter and leave in good weather.

The geographical position of the western point of Cape Gregory has been determined approximately by the U. S. Coast and Geodetic Survey as follows:

Latitude	43° 18′ 24″ north.
Longitude	124° 25′ 57″ west.

COAST SOUTH OF CAPE GREGORY TOWARDS COQUILLE.

The coast for three miles south of *Cape Gregory* is very precipitous; the cliffs are vertical and range from one hundred to two hundred and fifty feet in height; and the hills back of them rise to over five hundred feet. The hills are covered with dense forests and underbrush, and are cut by deep ravines running at right angles to the shore-line. From the number of these ravines the coast is locally known as "the *Seven Devils.*"

Beyond this to the southward the coast-line is more regular; the cliffs range from forty to eighty feet in height, and the back country is low, with rolling hills, heavily forested.

Dangers.—About four and a half miles south of Cape Gregory there are two outlying rocks; the outer one is about nine hundred and seventy-five yards (nearly half a mile) off shore and is awash at low tide; the sea breaks over it at high tide. The inner rock is seven hundred and sixty yards off shore and breaks only at low tide.

About a mile south of these dangers there is another rocky ledge extending about five hundred and forty yards (over a quarter of a mile) off shore; most of the rocks show well above the water and range from ten to forty feet in height. The cliffs from Cape Gregory end about four and a quarter miles north of the *Coquille River.*

From the mouth of the Coquille River to this cape the first four or five miles of the coast-line, to Whiskey Run, is bordered by low, rolling, auriferous sand and gravel hills, covered with thin soil and a scanty growth of grass and scattering trees. These hills front the sea in a continuous line of bluff, ranging from fifty to one hundred feet elevation. North of Whiskey Run the shore is formed by a bluish-gray, soft sandstone underlying the auriferous sands, and rises in height. Then there is an irregular line of yellowish, broken cliffs for four miles to Cape Gregory Light-house. Towards the northwest point the cliffs break down in places and the slopes down to the water appear covered with chaparral, with a low, uniform, yellow cliff as far as the light-house; and these cliffs are continued round the northern shore to Koos Head inside.

Cape Gregory presents the appearance of a comparatively low, flat-topped, table-land, covered with heavy, high pine, spruce, and hemlock. It is three or four miles broad as it faces the ocean, and extends back about three miles to the lower lands along the course of the South River

of Koos Bay. The highest part of the head is probably not more than six or seven hundred feet above the sea. On the low, flat hills southeastward of the highest part of the cape the trees are few, high, and scattered, as if the smaller trees had been burnt out. This is a special mark in making it from the southward. As seen from the south-southwest there are two or three very marked notches in the highest line of pines. Under the higher forest are rolling hills covered with chaparral to the water, or to the tops of the cliffs. On the north part of the cape, towards the light-house, there is a gap over which is seen a hill having a clump of scattered, tall trees upon it.

The northwesternmost part of the cape is a very narrow line of rocky cliffs stretching out half a mile northwest one-third north, and continued beneath the surface of the water as a danger for nearly another half mile. This narrow line of rocky cliff is about fifty feet high and peculiarly worn and cut by the ocean, so that part of it appears as rocky islets. In fact the point is cut off from the cape at high water; and upon its broader southern end there are trees, while the light-house marks its northern extremity. There are two smaller and parallel lines of cliff and rocks close to the western side of the light-house cliff, but they do not extend quite so far out. When a vessel is close inshore to the southward two rocks show a short distance from the western point.

To the northeastward of the extreme or Light-house Point, the shores of the head are jagged and broken, with points jutting to the north-northwest. The general direction to the south point of Koos Bay entrance is northeast by east for one and three-quarters miles. Abreast of this south point, which is called Koos Head, lies the low, sandy, north point of the entrance at a distance varying from three-quarters to half a mile directly to the north.

Inside of the light-house point the small, rocky points are as follows:

Yokam Point, nearly three-quarters of a mile north seventy-one degrees east (N. 71° E.) from the light-house, is low, rocky, and pointed to the northwest, with a reef stretching out nearly a quarter of a mile farther to the northwest. There are no trees on this point, nor for three-quarters of the distance towards the light-house point. Between the two points the rocky shore-line falls back a quarter of a mile and is fronted by a broad low-water beach. There are no soundings laid down in this bight.

Tunnel Point.—This is the second point, and it lies one and three eighths miles north sixty-five degrees east (N. 65° E. or NE. by E. ¾ E.) from the light house. Between Yokam Point and this point the shore falls back for four hundred yards to a low, sandy beach in front of the rocky shore. There are trees on Tunnel Point, and they extend nearly to Yokam Point on the west, and around Koos Head on the east. There is a broad low-water beach hence to Yokam Point, but no soundings are laid down between them. Tunnel Point is so named because there is a tunnel through it above high-water mark.

Koos Head.—This is the eastern point of the bight inside of the Cape Gregory Light-house, and forms the south point of the entrance to Koos Bay. It is a relatively high, rocky point, densely covered with trees and thick underbrush. The face of the eastern part of it is one hundred feet high, and it rises to a hill two hundred and twenty feet high at three hundred and thirty yards from the cliffs. It lies one and three-quarters miles north fifty-six and a half degrees east (N. 56½° E. or NE. by E.) from Cape Gregory Light house. It consists of several small, jutting points of rock, with sand beaches between them and a low-water sand beach just reaching their outer edges.

Off this northwest face of Cape Gregory, from the light-house point to Koos Head, there are soundings of five to nine fathoms at less than a mile from the shore. The older officers of the Hudson Bay Company informed us that some of their vessels, anchoring close under the northwest face of the cape, have ridden out heavy southeast gales; and the light-house steamer *Shubrick* has anchored close under the head in five fathoms of water during a southeast gale, putting to sea when the wind shifted to the southwest.

This is very important, because no other place on the coast between Drake's Bay and Neeah Bay (from latitude 38° 00′ to latitude 48° 24′) affords such protection. When a southeaster breaks up the wind usually hauls round to the southwest and then to the northwest, so that a vessel anchored in this place must be prepared to put to sea at once. In 1880 we recommended this as the most favorable point from which to extend a great breakwater to form a harbor of refuge from southeasters when the demands of commerce made it necessary.

Hydrography.—A detailed hydrographic survey of the Cape Gregory bight and the approaches to the cape has not been executed; but sufficient soundings have been made to show that the approaches are almost free from dangers, and that within a mile of the light-house a depth of not

less than fifteen fathoms is found on a northwest bearing. Inside of the light-house, towards the whistling buoy and the bar off the entrance to Koos Bay, the depths range from fifteen fathoms to four fathoms over sandy bottom, and the changes are generally quite regular.

Danger.—The approaches to the Cape Gregory bight have only one known hidden danger; this is the *Baltimore Rock*, which was determined by the U. S. Coast Survey in 1861. At that time the forward part of the wreck of the schooner *Baltimore* was sunk upon it, her foremast showing above water; her stern was lying on the beach close to the westward of Tunnel Point. A steamer struck upon this rock in 1873, and reported that it had but nine feet of water upon it, but in 1879 an examination found eleven feet. It lies a little over half a mile (one thousand and thirty four yards) north forty-nine degrees west (N. 49° W.) from Cape Gregory Light-house, on the direct prolongation of the line of the point. More particularly, it lies at the northwestern extremity of the irregular ledge, which carries a general depth of three to four fathoms, but is very jagged. The rock is small and pointed, its top surface having an area of only a few square feet, and the depth of water upon it is eleven feet. At ten yards outside of it the depth is seven fathoms, and for thirty yards directly towards the light house the depth of water is three to four fathoms, and deepening abruptly to seven fathoms. To the north-east and to the southwest the depths are about seven fathoms, and thirteen fathoms at one-sixth of a mile outside of it. Between this danger and the whistling buoy the least water is twelve fathoms, and between it and the bar of Koos Bay the depth decreases from eleven fathoms to four fathoms.

Broad off Cape Gregory no signs of hidden dangers have been discovered. Less than three miles broad off the southern part of the cape a sounding is given in twenty fathoms of water, and between it and the cliffs another in seventeen fathoms. A short line of soundings has been run off the light house on the course west by south three eighths south (W. by S. $\frac{3}{8}$ S.) with the following results: at two miles, twenty-seven fathoms; at four miles, sixty fathoms; at seven and a half miles, sixty-nine fathoms; and at ten and a half miles, seventy-five fathoms. A line of soundings has also been run nearly parallel with the coast-line, starting seven miles north fifty-eight degrees west (N. 58° W.) from the light-house with fifty-two fathoms over muddy bottom, and continuing on a north-northwest (NNW.) course with soundings of eighty-three, eighty-seven, eighty-four, and seventy-two fathoms over muddy bottom at intervals of eight miles.

Thirty-eight miles north fifty-eight degrees west (N. 58° W.) from Cape Gregory Light is the shoalest sounding found on the Heceta Bank. This bank, elsewhere described (p. 408), runs thirty miles northward and nearly parallel with the shore. It has not been exhaustively examined, but variable bottom, with soundings from forty-three to eighty fathoms, has been found; while slightly deeper water is found between it and the shore.

CAPE GREGORY LIGHT-HOUSE.

This is a secondary sea-coast light. This light-house is on the narrow islet, about fifty feet high, which is part of the sharp point projecting northwest one-third west half a mile from the extreme northwest part of Cape Gregory. The rocky projection stretches out a little more than four hundred yards beyond the light-house in the same direction: and on the same bearing, at half a mile from the light-house, lies the sunken Baltimore Rock with eleven feet of water upon it, already described above.

The structure consists of an octagonal wrought-iron truncated skeleton tower twenty-five feet high from the base to the focal plane. It is painted white and surmounted by lantern and dome painted black. As seen from seaward the tower is projected against the dark pine foliage, and is not readily recognized in day-time at a distance of ten miles. The keeper's dwelling is a wooden building of one and a half stories, painted white with green shutters to the windows, and is situated on the southern extremity of the islet at the edge of the trees, about three hundred and fifty yards southeastward from the tower. During the day-time one should not look for the light-house under the highest and more prominent part of Cape Gregory, but under the lower part to the northwestward.

The light is of the fourth order of the system of Fresnel, and was first exhibited November 1, 1866. It shows from sunset to sunrise a *fixed white light varied by a white flash every two minutes.* The duration of the steady light is one minute and thirty-five seconds; of the eclipse, ten seconds; of the flash, five seconds; of the eclipse, ten seconds. The arc of visibility is from southeast half east (SE. $\frac{1}{2}$ E.) through the south, west, and north to northeast by east (NE. by E.), or into Koos

Head. The height of the focal plane is seventy-five feet above mean level of the sea. In clear weather the light should be seen from a height of—

10 feet at a distance of 13.5 miles.
20 feet at a distance of 15.0 miles.
30 feet at a distance of 16.2 miles.

The geographical position of the light-house has been determined by the U. S. Coast and Geodetic Survey, and is:

Latitude	43	20′	36.3	north
Longitude	124	23′	11	west.
Or, in time	8h	17m	32s.7.	

On the 1st of January, 1885, the magnetic variation was 19° 50′ east, with an annual increase of 1′.4.

The following are the bearings and distances to prominent objects from Cape Gregory Light:

Fox Rock, the southernmost danger of the Orford Reef	S.	2	E.	36 miles.
Cape Orford Light-house, the line passing over Gull Islet one mile north of Cape Orford	S.	6	E.	31½ miles.
The mouth of the Coquille River	S.	9	E.	13½ miles.
The Whistling Buoy off the Bar of the Yaquina River	N.	2	W.	77½ miles.
The Yaquina Heads Light-house	N.	11¼	W.	81½ miles.
The Tillamook Rock Light-house	N.	14½	W.	156 miles.
Point Adams Light-house	N.	14	W.	171 miles.
Cape Disappointment Light-house	N.	15½	W.	176 miles.
Gray's Harbor (proposed light)	N.	18°	W.	217 miles.
Destruction Island (proposed light)	N.	21	W.	259 miles.
Tatoosh Island Light-house, off Cape Flattery	N.	23	W.	303 miles.

Cape Arago Life-saving Station.—On the Light-house island at Cape Gregory is located a life-saving station with all the usual apparatus in charge of a keeper. It has no permanent crew but depends on the services of volunteers to man the boat when it is needed.

This station is situated on the southeast side of the narrow, rocky islet upon which the light house is built; it bears southeast half east (SE. ½ E.), distant three hundred and sixty yards from the light-tower. This islet is separated from the main land by a channel about one hundred yards in width at high water, but more than twenty yards wide at low water. This passage was appears to be filled with sunken rocks, and it looks a very bad place from which to launch a boat in heavy weather.

Deep-sea Soundings off Cape Gregory.—The following soundings were made by the U. S. steamship *Tuscarora* on the 23d and 25th of October, 1873:

Distance and bearing from Cape Gregory	Latitude.	Longitude	Depth (fathoms)	Temperature at bottom.	Character of bottom.
Miles.	′	′			
6 S. 72 W.	43 24	128 10	1,067		Yellow brown ooze.
S. 81 W.	43 27	125 06	716		Dark sand and black specks.
S. 84 W.	43 27	124 57	492	No observations.	Do
3 S. 87 W.	43 27	124 18	180		
3¼ N. 88 W.	43 26	124 41	240		Dark sand
5½ N. 79 W.	43 25	124 32	61		Do.

Other soundings on the chart, but not taken by the *Tuscarora*, give sixty fathoms at four miles and seventy-five fathoms at ten miles west by south half south (W. by S. ½ S.) from the light house.

Cape Gregory was named by Capt. James Cook who placed it by bearings in latitude 43° and it is described by him as follows:

This point is rendered remarkable by the land of it rising immediately from the sea to a tolerable [illegible] that on each side of it is very low.

Vancouver placed it in latitude 43° 23′.

On De Mofras' chart, 1844, it is named Cape Redondo or Gregory.

Tebenkoff's chart of the coast, dated 1848, has only the name Cape Gregory.

In 1850 it was called Cape Arago on the reconnaissance survey of that year, and that name sometimes applied to it.

The Davison Inshore Eddy Current.—The *Ocean King*, a lareg coal-ship, was burned off Cape Gregory May 8, 1887; and during the topographical reconnaissance in the following August parts of a large burned ship were found on the beach between Heceta Head and Cape Perpetua, fifty-five miles to the northward of Cape Gregory.

KOOS BAY.

Two miles east-northeast of the reef outside of Cape Gregory Light-house is the wide and easily recognized entrance to Koos Bay and River. The south point of the entrance is named Koos Head; it is a rounding, rocky point, half a mile in circuit, with an indented shore-line. In each little cove there is a broad sand beach, while the low-water sand beach extends out to the front of the cliffs. The surface of the head is high and rolling, and is covered with a heavy growth of pine and a dense undergrowth of brush.

There are no detached rocky ledges or rocks round this head, except a small rock, called *Guano Rock*, which lies two hundred and forty yards northwest (NW.) from the northwesternmost part of the head, and one and three-quarters miles north fifty-three degrees east (N. 53° E.) from Cape Gregory Light-house. This rock lies to the southward of the channel leading in to the bay.

The north point of the entrance is low and formed of shifting sand dunes that reach one hundred feet in height. Before the present improvements by the United States Engineers the breadth of the entrance at high water was sometimes as much as three-quarters of a mile, and at low water three-eighths of a mile, with a narrow channel of nearly three hundred yards between the three-fathom lines. The points lay north and south of each other before any improvements were undertaken. Generally the bar off the entrance lay about three-quarters or one mile to the northwestward and even to the north-northwest of the southern point; and the depth of water on it varied very largely. In 1853–'54 there was a depth of nine to nine and a half feet on the bar. In 1861 it moved well to the northward; in 1862 the Coast Survey brig *Fauntleroy*, drawing ten feet, could not enter; in 1865 the channel ran parallel with the western side of the north point and far beyond it, with only seven feet in the shoalest part. At all times vessels entered and left with the flood tide because the bar then is smoother; with the ebb there is a heavy break unless the sea is remarkably smooth. The currents run very strongly, as might be supposed, from the extent of the bay and the size of the channel. We have seen the sea breaking completely across the entrance in moderate northwest weather, and know that the old mail steamer has tried to enter it, but upon seeing the danger would not take the risk. In 1861 the party examining it could get but one day's work on the bar during several months. In the spring of 1868 the brig *Admiral* reported waiting in the bay thirty-one days for a chance to get over the bar.

But the introduction of a steam-tug for piloting and towing vessels in and out has completely changed the traffic to this bay, and the Government is now constructing improvements intended to keep the channel in one direction and to increase the depth of water on the bar.

On the inside of the entrance and abreast of the north point the eastern shore of the bay is a low, irregular line of rocky cliffs, covered with a heavy growth of pine to their edges. The western projection of these cliffs is known as Fossil Point, which lies one and one-sixth miles northeast by east (NE. by E.) from Koos Head. From this point the United States Engineers propose to carry out a half tide jetty, or deflecting dike, eight hundred yards in length, on a slightly curved line towards Koos Head. By this improvement a depth of fourteen feet of water on the bar is expected. This jetty thus crosses entirely the former channel, where five fathoms of water was found, and reaches to the low-water line of the north point, which will necessarily be cut away. By the end of 1884 the jetty had been carried out six hundred and eight yards, with a depth of eleven fathoms seventy yards from its extremity, and the depth of water on the bar had increased one foot. In June, 1885, there was a depth of about twelve or thirteen feet on the bar, and it was then nearly northwest one-third west (NW. ⅓ W.) three-quarters of a mile from Koos Head, or farther south than when the channel swept well under the eastern side of Koos Head.

Koos Bay is very irregular in outline, but its general shape is somewhat like the letter U, with the convexity to the north, and having one arm nearly parallel with the coast and only a mile inside of it for six or seven miles. One small and shoal branch, called the South Slough, comes in from the southward behind Cape Gregory, but at its junction inside of Koos Head it has only two or three feet of water in it, except where the depth is contracted to three hundred and fifty yards, where there is a narrow channel way with seven feet of water in it.

North of the entrance at Koos Head the bay proper begins and runs a little east of north for seven miles to the great bend, where there is a broad, short, and shallow arm continuing north-

ward. The great bend is roughly east and west for two miles, and then the main bay trends south-southeast for four miles and increases in width to nearly two miles, with three-quarters of its area on the east bare at low water. Several sloughs enter at the southern head of the bay. *Coal Bank Slough* enters at the southwest angle and the main river comes in at the southeast angle. Up to the head of the bay there is a channel-way with more water than there is on the bar.

The *channel-way* before the jetty improvement was narrowest between Fossil Point and the north spit, being there only six hundred yards wide at low water, but carrying a depth of eleven fathoms. In this part of the channel lies the only danger in the bay thence to Empire City. This danger is named the *Fearless Rock*. It is a sunken rock lying six hundred yards north seventeen degrees east (N. 17° E.) from the present outer end of the jetty. It lies three hundred and sixty yards west (W.) from Fossil Point and one and one-sixteenth miles northeast (NE.) from Koos Head. It has eleven feet of water upon it. Since the jetty has been built a shoal has made over three hundred yards to the north of this danger. It has been marked with a buoy and must be passed at a distance of about one hundred yards to the westward.

Aids to Navigation.—In the approaches and in the bay, buoys have been laid down by the Light-House Board. As the entrance to the channel of this bay undergoes frequent and irregular changes in depth and direction, no course can be given to cross the bar. The change of tide often suddenly produces a change in the direction of the channel. The safest plan is to *wait for a pilot-tug*, which now takes vessels in and out even at night.

The Whistling Buoy.—This is the outside bar-buoy, and is *painted with black and white perpendicular stripes*. It is surmounted by a whistle, which is sounded by the action of the sea and gives twenty or thirty blasts per minute. It is moored two miles less one hundred yards north eight degrees west (N. 8° W.) from the light-house and two miles less three hundred yards north sixty-three degrees west (N. 63° W.) from Guano Rock.

This buoy was first located March 9, 1880, instead and in the place of the old outer bar-buoy. In December it broke adrift, and in August, 1883, was found on the beach between the Umpqua and the Siuslaw, and within three miles of the latter, having been borne northward by the inshore eddy-current a distance of thirty miles. The Light-House Board request navigators to report if the buoy is not sounding properly.

The Bar Buoy.—This is a second-class can-buoy, *painted with black and white perpendicular stripes*. From its present position on the chart the following bearings and distances are obtained: To Cape Gregory Light-house south forty-one degrees west (S. 41° W.), distant one and five-eighths miles; to Koos Head, inner tangent, south sixty-three degrees east (S. 63° E.), distant half a mile; to the whistling buoy north-northwest half west (NNW. ½ W.) distant one and a half miles.

The *Fearless Rock Buoy.*—This is a *third-class nun-buoy, painted red and numbered* **2**; the red buoy No. 2 is now placed two hundred and eighty-five yards west by north one-half north (W. by N. ½ N.) from Fossil Point.

Sand-spit Buoy.—This is a *first-class spar-buoy, painted black* and *numbered* **1**; it is placed on the western side of the channel. The distance between this buoy and the Fearless Rock Buoy four hundred yards, with a deep channel between them carrying ten fathoms of water. The following bearings and distances show the position of the buoy: Koos Head southwest (SW.), distant fifteen-sixteenths of a mile; end of half-tide jetty south by west (S. by W.) four hundred and twenty yards distant; Fossil Point east by north (E. by N.), in line with Fearless Rock Buoy.

Buoy on north end of shoal.—This is a *third class nun-buoy, painted red* and *numbered* **4**. It is anchored in nine feet of water on the north end of the shoal which has formed north of the Fearless Rock. After passing this buoy a vessel steers directly for the north wharf at Empire City, north by east one-quarter east (N. by E. ¼ E.) course for nearly two and one-fifth miles.

This buoy is now placed six hundred and seventy-five yards northwest by north one-half north (NW. by N. ½ N.) from Pigeon Point.

The following bearings and distances show the position of the buoy: Koos Head southeast three-fourths south (SW. ¾ S.), distant nearly one and a five-eighths miles; Fossil Point south three-eighths west (S. ⅜ W.), distant five-eighths of a mile; and Empire City north wharf north by east one-quarter east (N. by E. ¼ E.) nearly two and one-fifth miles.

After passing northward of Empire City the channel is marked by several buoys. At high water the bay appears very extensive, but at low water the shoals show the comparatively contracted channel-way.

About one-third of a mile north-northwest (NNW.) from Empire City wharf the survey locates *three sunken rocks* in an area of three hundred yards, with fifteen feet of water between and around them and from two to three feet upon them. The main channel is under the western shore, and therefore to the westward of these dangers.

At five-eighths of a mile north-northwest(NNW.) from Empire City lies the southern tail of the large middle ground, nearly midway between the two shores, or rather nearer the western shore. The western edge of this middle ground is one and one-third miles north-northwest (NNW.) from Empire City, and is marked by a red buoy as follows:

Middle Ground Buoy.—As just mentioned this buoy marks the western edge of the middle ground which tails down mid-channel to within five-eighths of a mile of Empire City. It is a *first-class spar buoy painted red* and *numbered* **6**. This buoy has been moved one and a half miles down the bay, and is now placed just to the westward of the three-feet rock which lies three-tenths of a mile north by west (N. by W.) from the upper pier at Empire City.

Great Bend Buoy.—At the western part of the great bend of Koos Bay, two and a half miles beyond Empire City, the shoals and flats make out from the south shores. At high water the shoals are covered; at low water a large area is bare. This buoy marks the north edge of the shoal, and therefore the south side of the channel. It is a *first-class spar-buoy, painted red* and *numbered* **8**.

The following bearings and distances locate this buoy: Poney Point, west tangent of cliff, southwest seven-eighths south (SW. ⅞ S.), three-quarters of a mile; Russell Point, northeast one-quarter east (NE. ¼ E.), two and one-quarter miles; North Bend Point, east one-third north (E. ⅓ N.), one mile; and Buoy No. 3, abreast of North Bend Point, northeast by east seven-eighths east (NE. by E. ⅞ E.), two and one-eighth miles.

A *red* buoy, No. 10, has been placed half a mile (one thousand and fifty yards) west by north (W. by N.) from North Bend Point.

North Bend Point Buoy.—This buoy is placed on the eastern edge of the channel. To the northward, eastward, and southward of it the shoals are very extensive and largely bare at low water. It is a *first-class spar-buoy, painted black* and *numbered* **3**; it is placed in eight feet of water. The channel between it and North Bend Point is not quite three hundred yards wide, but is scoured out to six fathoms, with scant two fathoms to the mill wharf, one-quarter of a mile south of the point. Vessels give this buoy a berth of one hundred yards. From this buoy to the southward the channel is close under the western shore, sweeping past the North Bend saw mill.

The following bearings and distances locate this buoy: East tangent of North Bend Point bears southeast one-fourth south, distant seven hundred yards; Russell Point north by west (N. by W.), half a mile nearly.

Buoy No. 5.—This is a *first-class spar-buoy, painted black* and *numbered* **5**. It is placed in nine feet of water on the western edge of a shoal between which and the wooded shore on the west side of the channel there is a narrow passage of only one hundred and twenty-five yards width carrying thirteen feet of water. Vessels give this buoy a berth of seventy yards. Under the wooded shore the low-water line makes out fifty yards, and widens in the curve hence to Marshfield Point.

The following bearings and distances locate this buoy: Cooper's Point bears north-northwest (NNW.) nearly three-quarters of a mile distant, with the North Bend saw-mill just open to the eastward of it; and Marshfield Point southeast seven-eighths south (SE. ⅞ S.), just over three-quarters of a mile.

The geographical position of Koos Head, the southern point of the entrance to Koos Bay, has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	43° 21′ 02″.9 north.
Longitude	124° 19′ 48″.3 west.
Or, in time	8h 17m 19s.2.

The magnetic variation was 19° 50′ east in January, 1885, and increases annually 1′.4.

Tides.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XIIh 01m. The mean rise and fall of the tides is four and eight-tenths feet; of spring-tides five and nine-tenths feet; and of neap-tides three and seven-tenths feet. The mean duration of the flood is 6h 05m; of the ebb 6h 20m; and of the stand 0h 39m.

The two tides of the same day are generally unequal in proportion to the moon's declination. At the full and change of the moon the high waters will be five-tenths of a foot higher than the average, and the low waters five-tenths of a foot lower. At the moon's first and last quar-

ters the high waters are five-tenths of a foot lower than the average, and the low waters do not fall so low as the average by five-tenths of a foot.

The times and heights of every tide of the year can be found by consulting the Pacific Coast Tide Tables, published annually by the U. S. Coast and Geodetic Survey. For the required tide at Pigeon Point take out the time and height for Astoria, then from the given time of high water subtract 44m, and from the height subtract one and seven-tenths feet; from the given time of low water subtract 46m, and from the given height subtract three-tenths of a foot.

These tables show that at North Bend saw-mill the high tides are 1h 17m later than at the mouth, and the low tides 1h 28m later.

Currents.—The direction of the ocean currents in the vicinity of Koos Bay entrance is partly shown by the drifting of the buoys which break adrift. They all move to the northward, and have been picked up as far as the Siuslaw River. In 1885 the whistling buoy broke adrift and was picked up that far north.

Koos Bay is in the customs collection district of southern Oregon. Empire City is the port of entry. It is situated four miles inside the entrance to the bay on the east bank. It has a large mill and a wharf that extends to sixteen feet of water. The commerce of the bay has very largely increased, and in the four years, 1881–1885, the number of vessels crossing the bar was eleven hundred and eighteen, of which ninety-eight drew more than thirteen feet of water. A few foreign vessels enter for lumber cargoes. In 1885 the exports embraced seventeen million five hundred thousand feet of lumber and twenty-nine thousand tons of coal. There are four large saw mills on the bay. Ship-building was commenced at the North Bend in 1859, and up to the year 1883 there had been constructed and fitted out for sea twenty-nine vessels having an aggregate of eight thousand four hundred and fifty-eight tons, or an average of two hundred and ninety two tons. The largest vessel built was the ship *Western Shore*, of one thousand one hundred and eighty seven tons, launched in 1874.

The coal mines are three miles up the Coalbank Slough, which makes into the southwest part of the bay. Koos River proper enters the southeast part of the bay, and it is said that if the river bars and snags were removed small steamers could reach the head of navigation thirty miles distant.

The word Koos is that approaching nearest to the Indian pronunciation of the name of the bay. It is said to signify a lake, lagoon, or land-locked bay. It is frequently spelled Coos or Cowes. Duflot de Mofras amusingly translates it R. des Vaches; and Tebenkoff, perhaps misled thereby, called it the R. Konova for Korova or Cow River.

The U. S. Coast Survey published a chart of the bay and approaches from the survey of 1861.

Magnetic Variation.—For January, 1885, the line of equal magnetic declination of 20° east cent the coast-line north of Koos Bay in latitude 43° 35′, and therefore south of the Umpqua River. It will move annually about one mile to the northward for a few years until the maximum eastern declination is reached.

THE UMPQUAH RIVER.

The coast line runs almost north for twenty miles from Koos Bay to the mouth of the Umpqua in a nearly straight line of low shores bordered by bright sand dunes, which show very clearly from the distance of ten miles, and therefore they are moderately high. The country immediately behind them is moderately low and densely wooded for several miles. In the distance the northwest spur of the Umpquah Mountains comes in from the main range which runs nearly north-northeast and south-southeast. For ten miles from Cape Gregory Light-house the waters of Koos Bay and its northern branch lie a mile or two behind the coast-line. At fourteen miles from the light house there is a small stream, called the Ten-mile Creek, thirty yards in width, which drains some of the lakes or lagoons behind the coast ridges. The topography north of this stream shows the coast to be a line of ridges, reaching five hundred feet elevation, with long intervening valleys nearly parallel with the shore.

From Ten-mile Creek the distance is seven miles to the mouth of the Umpquah, and the shore line is backed by sand dunes which in two miles reach to the edge of the forests on the higher ridges. These dunes generally lie in drifts in the direction of the summer winds and attain as much as four hundred and twenty feet elevation at the forest-line. Throughout these drifts are large hollows, reaching four hundred yards in extent and sunk as much as sixty feet below the

surrounding level. In some cases these depressions are marked by a line of pine trees; in others they are in the bare sand. Very curiously, when the sand reaches the forest-line it invades the wooded parts in drifts running to the north, and in these lines the wind draws from the southward. These great sand dunes are the most noticeable on the whole line of the coast. They gradually decrease in breadth and in height towards the southern point of the entrance to the Umpquah, so that at a little less than two miles from the mouth of the river the dune line is only seven hundred yards wide and eighty feet high to the edge of the forest. But sharply up from this inner sand border appear through the trees two small, irregular patches of white sand among the tree-tops. This is the distinctive feature for making the bar of the river. The highest part of the visible sand is two hundred and ninety four feet. Very curiously, two great depressions lie in this bare sand ridge on the farther side, and beyond them one or two lagoons. This sand-dune mark in the forest lies one and a half miles south seventy degrees east (S. 70° E.) from the buoy off the bar.

Behind the southern point of the Umpquah a spur of the mountains comes from the southeast closely towards the shore.

There are no hidden dangers off the line of coast from Ten-mile Creek to the mouth of the Umpquah, and the depth of water is ten to fifteen fathoms at a distance of a mile from the shore.

The Umpquah River is the largest stream entering the Pacific Ocean between the Sacramento and the Columbia Rivers. Its mouth lies fifty-two and a half miles north one-quarter west (N. ¼ W.) from Cape Orford Light, and twenty-two miles north one-eighth west (N. ⅛ W.) from Cape Gregory Light. It rises a little south of the latitude of Cape Orford, about forty-five miles in from the coast, and runs north-northwest for fifty-five miles, when it strikes nearly west for the coast. Between it and the coast lies the Umpquah range of mountains, culminating in Mount Arrington, in latitude 43° 17′ north, longitude 123° 48′ west, and lying twenty-five miles north eighty one degrees east (N. 81° E.) from Cape Gregory Light.

The mouth of the river valley is an opening three or four miles wide, with a broad peninsula of high sand dunes barring the northern side. To the south are moderately high hills, covered with heavy forest and impassable undergrowth. The southeastern side of the valley is bordered by moderately high rocky cliffs covered with pine and spruce, and along the northwest face of this rocky line runs the Umpquah River for five or six miles in a general south-southeast direction, and with an average width of half a mile, although it expands towards the great bend, but is there filled with broad shoals. The river appears to be crowded against the southeast rocky shore by the great sand dunes forming the north point of the entrance, the sand of which is being continually driven across the peninsula into the river, carried out by the current, and then moved north by the littoral current. These shifting sand dunes of the north side of the entrance to the river attain an elevation of one hundred and twenty-eight feet above the sea on the river shore. These sand wastes run for three miles nearly north by west, with an average breadth of over one mile, and then suddenly change to high, sandy hills, covered with spruce, pine, and a dense undergrowth. But even outside these wooded hills the immediate coast-line is a white sandy stretch many miles thence to the northward.

The high land on the south side of the river entrance is bordered by a line of low sand dunes about one-quarter of a mile in width, and increasing in breadth and height to the southward, as already described. These dunes, and the high ones in the forest at the south of the entrance, are notable features and landmarks for making the river. Their relation to the Outside Bar-buoy is given on page 402.

The mouth of the river was nine hundred and ten yards wide at the time of the survey in 1886, and the extremity of the northern point of the entrance lay north forty degrees west (N. 40° W.) from the nearest rocky point on the eastern shore inside the river. This rocky point lies three-quarters of a mile inside the south point of the entrance, and forms the southwest part of the sharp recession of the rocky shore at Winchester Bay. From the southern point of the entrance, which we have already mentioned as being low and sandy, the shore line of the south side of the river is nearly straight north thirty degrees east (N. 30° E.) for one and one-sixth miles to Winchester Bay. But this sandy shore decreases in width as it reaches inland, and halfway to Winchester Bay it meets a slight bluff and then a rocky shore covered with a heavy growth of fir and underbrush. It was at this division of the shore, from the sand to the fast land, that the old light house was built and subsequently carried away.

Inside the entrance the lower reach of the river is long and narrow, averaging less than half

a mile for about two miles and then expanding to more than one mile in width. Its general direction is north for six miles; it is bordered on the southeast side by a rocky, wooded shore; and on the northwest side for two miles by loose and shifting sand hills, changing after the first mile to sand sparsely covered with coarse grass, bushes, and fir, and in four miles to steep, high, rocky banks covered with large trees.

Winchester Bay.—Just inside the river entrance there is a recession of the rocky shore on the east side which forms Winchester Bay. From the south to the north point the distance across this bay is two-thirds of a mile, and the depth half a mile. At the northeast angle of the bay is a cluster of houses known as Reed's Ranch. Into the southeast angle of the bay enters a small stream, twenty yards wide, at the south end of the sand beach. The bay is shoal, and the middle of it is directly abreast the end of the north point of the entrance to the river. The depth of water along the front of the bay, between the two points, is ten feet with sandy bottom.

A rocky reef, visible at extreme low tides, lies under the southeast shore five hundred yards before reaching the south point of Winchester Bay. Its outer edge lies one hundred and fifty yards from the shore; and the channel is here narrow and runs close to the northwest side of this reef.

Ork Reef.—In the middle of the river, abreast the northern part of Winchester Bay, there is a patch of sunken rocks and sand flat known as the Ork Reef from the vessel that first struck upon it. It lies a little over half a mile north one-quarter east (N. ¼ E.) from the first rocky point inside the entrance. Vessels would be apt to keep well in towards Winchester Bay and east of the Ork Reef, but from this rocky point the channel runs diagonally across the western shore and to the westward of the Ork Reef.

The *bar of the river* changes its position under varying conditions of storms from seaward, and great freshets down the river. It generally maintains a depth of not less than thirteen feet of water, and lies about two-thirds of a mile from the low, sandy, southern point of the entrance. In moderate weather the position of the bar and channel is well marked by the breakers on either side, but in heavy southeasters the swell breaks clear across the entrance, and it is at times impossible to tell exactly where the channel is except by the Outside Buoy which is changed by the Light-House Board so as to maintain a certain relation to the bar and channel.

From the bar the channel generally runs towards the low south point of the entrance, and thence along the southeast shore for more than a mile to the first rocky point on that shore. On the northwest side of the channel is an immense sand flat, largely bare at low water, stretching to the southward from the north point of the entrance and reaching to within three hundred and twenty yards of the south shore. This sand flat has two or three narrow, shoal passages through it, but in mid-entrance it is half a mile wide.

After protracted storms, as in November, 1858, the bar changes greatly in position and depth. At that time the steamer *Columbia* could not leave the river for about ten days; upon examination it was found that the channel across the bar had moved about three-quarters of a mile northward of its former position with an increased depth of three and a half fathoms.

In October, 1887, there were two channels into the Umpqua, with a long middle stretch of sand between. One channel ran out under the south shore and the other under the north shore.

There is now a powerful tug-service for the bar to tow the heavily laden lumber vessels out or bring them in when light. This tug keeps a constant watch over the changes in the depth on the bar and the direction of the channel, so that there is now no delay in entering or leaving this port.

Aids to Navigation.—There are no buoys to aid navigation inside the bar, but the tug belonging to the mill company acts as pilot to all incoming and outgoing vessels.

Outside Bar-Buoy.—This is *a second-class can buoy, painted with black and white perpendicular stripes*, and is passed on either hand. It is placed in ten fathoms of water over sandy bottom in general direction west-southwest from the entrance to the river.

The following bearings and distances locate the buoy and its relation to the bar in October, 1888.

The southern end of the north sand point of entrance bears northeast one quarter north (NE. ¼ N.), distant one and seven eighths miles; the southwest point of Winchester Bay fifty-five degrees east (N. 55° E. or NE. by E.), distant one and seven-eighths miles, with the Reed houses in the northeast part of the bay open about one-eighth of a point; the nearest point of the beach at the change of direction of the shore east (E.), distant one mile; and the south end of the sand-dune landmark among the trees south seventy two degrees (S. 72° E.), or east by south half south, distant one and a half miles.

From this buoy the present point of the breakers stretching down from the north point to the channel, just outside the bar, bears east by south two-thirds south (E. by S. $\frac{2}{3}$ S.), distant half a mile.

SAILING DIRECTIONS.

Owing to the changeable character of the bar and entrance no minute directions can be given for entering; and none are needed by vessels being towed in and out. But in case the tug should be temporarily disabled the following general directions may be useful in entering the river:

After passing the outside buoy, steer for the opening in the line of breakers and pass around the southern point of the north breakers; then steer for the rocky point on the south side of Winchester Bay, keeping as close to the breakers on the north side of the channel as the draught of the vessel will permit, and keeping the lead going. Take care to avoid the rocky reef which lies one hundred and fifty yards from the south shore at one-quarter of a mile before coming up with the first rocky point on that shore. Reed's Ranch houses in the northeast part of Winchester Bay on with the extremity of this first rocky point furnishes a fair range for this part of the channel, from the bar to the point (1886). When within one hundred yards of this rocky point change the vessel's course to north half west (N. $\frac{1}{2}$ W.), which is towards the northern, sandy peninsula, and run two-thirds of a mile; or until Reed's Ranch houses are just shut in behind a jutting point on the north side of Winchester Bay. Now change the course to northeast (NE.) for the eastern, high shore of the river. Keep along this shore at a distance of about one hundred and twenty-five yards, changing the course gradually to north, and run almost three miles until a large and conspicuous dead tree, standing about two hundred yards from the shore on a wooded hill three hundred feet high on the west side of the river, bears northwest half north (NW. $\frac{1}{2}$ N.). The channel now crosses to the other side of the river on a general northwest course and shoals in this reach to ten feet at low water. The best direction for this part of the channel is to run for this dead tree on the above bearing for about three quarters of a mile, when the Gardiner saw mill will open out by the high point on the east side of the river. Now keep along the western and northern shores of the river at a distance of about one-quarter or a mile, all around the great bend of the river. When about one mile from the mill, where the log-booms are reached, keep close to these booms up to the wharf.

The distance from the Outer Buoy to the saw-mill wharf, by the channel of the river, is about nine miles.

A *light-house* was erected in 1857 at the south side of the entrance to the Umpquah River, a short distance away from the bluff and on the beach, which was of shifting sand. On the 8th of February, 1861, during a heavy freshet in the river, the base of the tower was undermined and the structure fell. It has not been replaced, and this mention is made of the facts because the light was continued on foreign charts for many years after its destruction.

The geographical position of the river is founded upon the secondary astronomical station of the U. S. Coast Survey in 1853, when it was established on the edge of the first clump of pine trees on the west side of the river, one mile from the north point of the entrance, as follows:

Latitude	43° 41′ 45″.3 north.
Longitude	124° 09′ 57″.0 west.
Or, in time	8h 16m 39s.8.

The geographical position of the southern extremity of the north point of the entrance is:

Latitude	43° 41′ 11″.4 north.
Longitude	124° 12′ 11″.2 west.

The geographical position of the smoke-stack of the new mill at Gardiner is:

Latitude	43° 43′ 52″.5 north.
Longitude	124° 07′ 20″.5 west.
Or, in time	8h 16m 29s.4

This position is especially useful for vessels bound for distant ports.

The magnetic variation was 20° 02′ east in January, 1885, with an annual increase of about 1′.5.

Tides.—The approximate Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XIIh 10m. The mean rise and fall of the tides is five feet.

For a close approximation to the times and heights of each high and low water throughout the year, obtain the times and heights for the required date at Astoria from the tide-tables of the U. S. Coast and Geodetic Survey, and then from the given time of high water subtract 35 [illegible] and from the given height subtract one and four-tenths feet; from the given time of low water subtract 34m, and from the given height subtract three-tenths of a foot.

The following bearings and distances are given from the mouth of the Umpquah River to important objects:

Cape Gregory Light-house	S. 1° E.	21½ miles.
Siuslaw River	N. 11° W.	20 miles.
Heceta Head	N. 13° W.	27⅛ miles.
Cape Perpetua	N. 13½° W.	36¾ miles.
Yaquina Head Light-house	N. 13⅝° W.	59[illegible] miles.

Gardiner is in the collection district of southern Oregon, but the port of entry is at Empire City, in Koos Bay. It is a place of about two hundred inhabitants. It is on the north shore or right bank of the river, just beyond the great bend, so that a vessel passing up the river four and a quarter miles from the southwest point of Winchester Bay will see it open past the northern most point of the starboard shore. It is six and three-quarters miles by mid-river course from the southwest point of Winchester Bay. It lies on the narrow, low strip of land under the wooded ridge that reaches three hundred feet elevation. It has a large saw-mill, situated at the [illegible] end of the town, which furnishes lumber cargoes to about fifty or sixty large vessels annually. Vessels lie at the wharf in sixteen feet of water at low tide.

The geographical position of the saw-mill is:

Latitude	43° 43′ 37″ north.
Longitude	124° 06′ 00″ west.
Or, in time	8h 16m 24s.

The Umpquah River drains an exceedingly fertile region; part of it is well forested and part abounds in broad valleys and rolling land well adapted to agriculture and grazing, and now occupied by a large population. The Oregon and California Railroad runs partly in the valley of the Umpquah and partly in the valleys of its tributaries. The river breaks through the moderately low coast range below Scottsburg, which is about fifteen miles above Gardiner. Smith's River, which is an affluent of the Umpquah, enters it about two miles above Gardiner, and comes from the east-northeast through a narrow line of drainage.

The Indian name of the river below the rapids is said to be Kah-la-wat-set, and to the upper part they apply the name Umpt'quah.

On De Mofras' chart it is called Rio de A[illegible]ilar ou R. Umpqua.

Tebenkoff has the entrance to the "Um[illegible]a," and an Indian village at the mouth, in latitude 43° 56′.

The Coast Survey schooner *Ewing* anchored off the entrance in fifteen fathoms of water in 1850. The first vessel we know of entering it was the schooner *Sam. Roberts*, August 4, 1850, after coming out of Rogue River. We entered the river in 1853 and made the first accurate determination of its position.

This river has been supposed to be that discovered by one of the vessels of Vizcaino in 1603, but he did not reach this latitude. It has been referred to as "the River of the West," but Cartver in his narrative refers three times to the "Oregon, or River of West."

The first preliminary chart of the bar and the river for five miles was published by the U. S. Coast Survey in 1854.

THE COAST NORTHWARD OF THE UMPQUAH.

General Description.—When abreast the Umpquah River the valley through which it r[illegible] the coast is quite broken down; the Umpquah mountains are close to on the south, and a [illegible] mass further to the north. This lower range is thrown well back and lies between the tribu[illegible] of Smith's River, coming from the northeast into the Umpquah, and the short tributaries [illegible] Siuslaw.

There are no notable landfalls upon the immediate shore thence for some miles to the [illegible] ward. From the mouth of the Umpquah to Point Adams, at the mouth of the Columbia (one hundred and fifty-three miles), the coast-line runs in a remarkably straight line north seve[illegible]

degrees west (N. 17° W.). Nowhere does it retreat more than five miles to the eastward. The shore preserves its general appearance of a long line of white sand dunes, backed by a heavily forested and moderately low country, and broken by moderately high, rocky heads covered with dense forests of pine, spruce, and cedar. These capes project a very little beyond the general straight line of the coast, but they are particularly noticeable because the low, sandy reaches to the north and south of each, and the low country adjacent give them a prominence otherwise not so marked. These features change to a certain degree northward of the Yaquina River by the decreasing of the extent and height of the sand dunes and the extent and height of the mountain masses which come to the front at Cape Foulweather, Cape Lookout, Cape Meares, Cape La Mesa, Cape Falcon, and Tillamook Head.

The stretch of coast hence to the Yaquina Head Light is fifty-nine and three-tenths miles and the bearing north thirteen degrees west (N. 13° W.). In no place does the shore-line recede to the eastward over one mile and an eighth from this straight line which passes five-eighths of a mile outside Heceta Head; two fifths of a mile outside Cape Perpetua; and five-eighths of a mile outside of the bluff at Seal Rocks above the Alseya River.

FROM THE UMPQUAH RIVER TO HECETA HEAD.

The coast-line is straight, north thirteen degrees west (N. 13° W.), for twenty-seven and one-fifth miles from the north point of the Umpquah River entrance to Heceta Head; for two or three miles the high sand dunes, forming the north point of the Umpquah, stretch a mile inshore, and then follows a succession of high sand ridges densely covered with forest which comes down close to the shore for several miles.

At six miles northward from the north point of the Umpquah River entrance there was seen as late as 1885 part of the machinery of the iron steam-ship *Tacoma* lying half a mile off shore. She was lost here in February, 1883.

At six and three quarters miles from the Umpquah this uniform stretch of shore is broken by the mouth of the *Tahkenitch Creek*, which discharges the waters of a large lagoon situated several miles inland behind the immediate coast ridges. Inside the entrance of this creek, the stream runs northward parallel with the coast for one and a quarter miles and only two hundred and fifty yards inside the ocean beach.

Tahkenitch Lake lies in the hills one mile back from the shore. The sand dunes are here comparatively low and less than a mile wide.

At eleven and three-fifths miles from the Umpquah River two lagoons, the Tsiltkoos Lake, which is quite large, on the south, and the Woahink Lake from the north, discharge by the Tsiltkoos River.

Woahink Lake, one mile north of Ten-mile Creek, empties by a small stream into the Tsiltkoos Creek, one-quarter of a mile from that lake.

These lakes indicate a great wave of sand along the coast and parallel thereto with the lakes behind them.

The mouth of the Tsiltkoos River is in latitude 43° 52′ 21″ north.

Along this part of the coast the shore is a low, sandy beach with sand dunes, and behind the sand dunes low wooded ridges rising to three hundred and five hundred and forty feet within a mile or a mile and a half. Behind the lagoons, which are one and a half miles inland, there are high wooded hills.

A short distance north of the Umpquah River, Tebenkoff lays down a small cove which he calls Sisman Bay, very probably the opening of the Tsiltkoos River. On a late State map this latter river is called the Chilcoose.

THE SIUSLAW RIVER.

At twenty miles north by west from the Umpquah River is the mouth of the Siuslaw River. This is a moderately large stream coming from the southeastward under the flank of the Calapooya Mountains. There is a clean sand beach all the way from the Umpquah River to the Siuslaw River and as far as Heceta Head. North of the Tsiltkoos River, the sand dunes reach over one mile inland, and then commence the pine woods on low hills. The western part of the Calapooya Mountains approaches the coast between the Tsiltkoos River and the Siuslaw River, and has a general direction west-southwest. In latitude 43° 57′ north and five and three-quarters miles inside the coast-line, the range is twelve hundred and eighty feet high.

For two miles south of the mouth of the Siuslaw River there is a peninsula half a mile wide separating the Siuslaw from the ocean. It is a waste of bare sand dunes terminating in a sandy point forming the south side of the entrance to the river. And this point is prolonged (1883) nearly seven-eighths of a mile by a broad sand spit, bare at low water, so that the stream passes under the bluffs and wooded slopes which are visible over this point and spit. Just over the south point on the right bank of the river there rises a small hillock, one hundred and forty feet high, covered with fern and a few pine trees.

This north shore runs nearly north-northwest for two miles outside this hillock with bluffs that reach one hundred and two feet elevation and decrease to cliffs of fifty or sixty feet. Behind these cliffs the tree-covered mesa is curiously cut by gullies lying in the direction of the prevailing summer winds.

In 1877 the coasting steamer *Duncan* entered this river and reported two fathoms of water on the bar at low water; the bar was half a mile across and usually broke heavily. There were two channels early that winter; the north channel was the permanent one, and the south channel fills up. The current was very strong over the bar and inside at the anchorage. Reports differ very much as to the possibility of navigating the upper part of the river.

It was first reconnoitered by the Coast and Geodetic Survey in 1883 when the bar was found to be bad and had only five feet of water upon it. The bar was nearly a quarter of a mile across and the channel narrow; it could be crossed only on the flood-tide near high water. From the two white beacons on the north shore just under the one-hundred-foot bluff (which is three-quarters of a mile inside the north point) bore west by north one quarter north distant three-quarters of a mile, and the hillock inside the south point bore west by south distant one and a half miles.

But in 1887 this bar was found not only to have changed its location, but from the northernmost point of the cliffs a great sand flat had made out fully three-fourths of a mile to the south, and changed the whole location of the bar. It is therefore evident that only a local knowledge will serve to determine the peculiarities of the bar and channel at any time. A steam schooner of sixty or seventy tons was running here from the Columbia in 1887.

It is reported that the bar works around from the south to the north as far as possible, and then again breaks out near the south spit. When it is settled towards the north it is claimed to carry nine feet of water; but that it has less during the change.

There is a *sunken rock* near the beach about half a mile to the southward of the south spit.

The geographical position of the entrance to the river has been closely determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	44° 00′ 40″ north.
Longitude	124° 07′ 25″ west.

The North Point Hill is in latitude 44° 02′ 00″.

In January, 1887, the magnetic variation was 20° 30′ east, and the yearly increase two minutes.

Tides.—The Corrected Establishment, or mean interval between the moon's transit and the time of high water, is XII^{h} 03^{m}, but this time may be fifty minutes greater or less, on account of the declination of the moon. The approximate times of the high waters are half an hour earlier than at Astoria, and of low waters one hour earlier. Find from the Pacific Tide Tables the required tide at Astoria for the required day of the year, and apply the above corrections.

The mean rise of the greater high waters above the plane of reference is six and four-tenths feet, and of the smaller high waters five and two-tenths feet.

The river carries a depth of ten feet for twenty miles to the head of tide-water. The width decreases from five hundred yards near the mouth to thirty-five yards at the head of navigation. The shores are lined with pine and fir, but forest fires have swept through this region and have destroyed large areas of finely wooded country; a second growth is springing up. In the river bottom are some fine pieces of open land.

From the head of navigation a road has been completed to Eugene City in the Willamette Valley. There is a semi-weekly stage and mail.

At four miles above the mouth the river receives two tributaries; the one from the southeast drains a lake which overlaps part of the Woahink Lake which empties through the Tsiltkoos River.

The town of Florence is situated on the right bank of the river about three miles above the entrance. There is a large salmon cannery here; a second on the left bank of the river one mile higher up; and about three miles up on the right bank there is another cannery and also a small steam saw-mill.

Buoy.—In September, 1887, a *second-class nun-buoy* with *black and white perpendicular stripes* was moored in nine and a half fathoms of water. It lies west-southwest (WSW.) from the mouth of the channel of June, 1887, and is probably two miles from the north shore. Nearly half a mile south-southeast (SSE.) from the outer hillock on the north shore there is a small gully breaking through the partially bare-faced cliff; and on the west side of this gully, and overhanging the cliff, is a small unpainted shanty. The buoy lies west-southwest (WSW.) from this shanty.

Sunset Mountain lies just ten miles south eighty-two degrees east (S. 82° E.) from the north point of the entrance to the Siuslaw River. It is two thousand feet high, and thickly wooded; between it and the coast the wooded ridges and hills are from twelve hundred and eighty to five hundred feet above the sea.

HECETA HEAD.

Northward from the Siuslaw River the low shore marked by sand dunes backed by forests continues for five miles to the southern part of Heceta Head. From the Umpquah entrance to this head, a distance of twenty-eight miles, the stretch of shore line is almost straight, swinging in a long, flat arc only half a mile to the eastward. The bearing of the head from the north point of the Umpquah River entrance is north thirteen degrees west (N. 13° W.) and the distance is twenty-seven and one fifth miles. About three miles northward from the present north point of the Siuslaw, a small stream locally known as Sutton Creek enters the sea. It drains two lakes about two miles inland. A second small stream called Berry Creek is one and three-fifths miles northward of Sutton Creek and it drains a small lake half a mile back. Behind Berry Creek is the western spur of a wooded ridge coming upon the coast from the eastward and terminating at Cape Heceta; it is locally known as *Cape Mountain*.

The seaward face of Heceta Head is about two and a half miles in extent, and, although it projects but slightly outside the general line of the nearly straight coast, yet it is quite noticeable, especially when a vessel is close under the shore. It is the first break in the long extent of low sand-dune shores backed by low forest-covered hills hence from the vicinity of the Umpquah, while northward from it the shore is moderately high but broken by sandy patches of sloping bluffs. The summit of the head is the middle part, where it reaches one thousand feet elevation within half a mile of the sea. This summit and the whole seaward face are covered with grass and green herbage, with a few pines, but thence inland the land rises to one thousand four hundred and ninety feet in two and three-fourths miles to the southeast by east, and the pine forests have been burnt. The extreme western point is one mile northwest of this higher part, and projects but slightly outside of it. It has nearly half a mile frontage, and is a rough, rocky cliff rising to five hundred feet within one-eighth of a mile. At two miles northeast from the head the hills reach one thousand two hundred feet in elevation. Five miles broad in from Heceta Head, and one mile less in latitude, the hills reach two thousand one hundred feet in elevation and are covered with forest.

Two small cascades are seen near the southern part within the first half-mile, and a small rock lies close under the cliff just north of the southern cascade. Under the southern side of the roundest part of the head there is a small cove with a sandy beach. Under the westernmost point there is a second and deeper cove with a sandy beach, through which a small stream, known as *Cape Creek*, breaks. There is a house on the north side of this stream, and two rocks under the western point of the north cliffs make a good protection. Immediately north of this part of the head the forests approach the line of low, broken, sandy cliffs; the land continues to rise to about one thousand feet elevation in a mile or a mile and a half.

The extreme western and northern part of the head is marked by a very regular *conical rock*, one hundred and eighty feet high. It is sharp and black, and is distinctly made out when a vessel is approaching from the southward or northward. The beach behind this rock has no trees, but is covered with grass and fern.

Cox's Rock is one hundred feet high, conical, with top white from guano; it is close to the southernmost shore of the head at one and two-thirds miles from the westernmost projection of the head, so that it is not made out by vessels approaching the cape.

There are two sunken rocks, respectively one quarter and one-half mile to the southeastward of Cox's Rock. Except these there are no known hidden dangers off this head.

The rocky cliffs of Heceta Head are from one hundred to two hundred feet high and nearly vertical; behind them rise high ridges formerly covered by dense forests that have been swept by fire, and now only dead, gray trunks are standing through and above a second growth.

The five-hundred-feet hill is clear of trees, but covered with grass and fern.

This headland is cut by two deep ravines which open at right angles to the shore. The geographical position of the westernmost part of the head is, approximately:

Latitude	44° 08′ 25″ north.
Longitude	124° 06′ 10″ west.

The magnetic variation of the compass was 20° 28′ east in January, 1885, and increases 2′.0 annually.

From the head we have the following bearings and distances to prominent objects:

Cape Orford Light-house	S. 7° E.	8¼ miles.
Cape Gregory Light-house	S. 8° E.	51 miles.
The bar of the Umpqua River entrance	S. 13° E.	29 miles.
Yaquina Heads Light-house	N. 18° W.	30 miles.

To the westward of this cape lies the Heceta Bank, and it would appear from a single line of soundings run therefrom that the bank reaches close in to the head, off which, at a distance of two miles, a depth of twenty fathoms is laid down.

Heceta Head was named by the U. S. Coast Survey in 1862 to commemorate the discoveries of Don Bruno de Heceta.

Heceta Bank.—Sixty-three miles northwest by north (NW. by N.) from Cape Orford Light lies the southern part of this bank so far as it has been examined. From that position, where the depth is sixty fathoms over a bottom of blue mud, the bank stretches north-northwestward, parallel with the coast, for thirty miles to a depth of eighty-three fathoms over gray sand, at a distance of thirty-five miles from the shore. The probable breadth of this bank is a little over fifteen miles within the sixty or seventy fathom limits. The least water found on the bank is forty-three fathoms, and the bottom varies through blue mud, coral, rocky, gray sand, and pebbles. Inside of this bank the depth slightly increases, but there are indications of a deep submarine valley coming inside of its southern extremity. Two off-shore lines of soundings, one to the northward (latitude 44° 50′) of the bank and one to the southward (latitude 43° 20′), exhibit depths of five hundred and eight hundred fathoms at the same distances from shore where we find seventy-one and forty-three fathoms on the bank. There is one place where the bank would appear to reach into the shore. A single line of soundings runs from the bank to Heceta Head on a general east by north course, and the greatest depth exhibited on this line is sixty fathoms seventeen miles from the head; there is a depth of twenty fathoms at two miles from the head.

When Don Bruno de Heceta was upon this coast in August, 1775, in the frigate *Santiago*, he says that in this vicinity

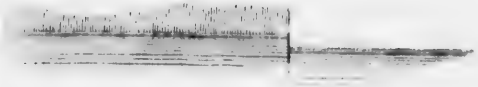
> he noticed a remarkable difference in the soundings, because at a distance of seven leagues from the shore he obtained bottom at eighty-four fathoms, whereas on nearing the coast he found at times no bottom. This leads me to believe that on this coast there exist sand banks, which are moreover denoted by the color of the water."

The bank was partially sounded out in 1853, and was named by the U. S. Coast Survey in 1862.

Cape Cove—Heceta Head.—This is a small cove under the southern side of the north point of Heceta Head. The north point has a frontage of nearly half a mile with a pyramid rock rising to a height of one hundred and eighty feet, while the point itself is three hundred feet high and at only one hundred yards back. This pyramid rock is seen only when a vessel is close inshore because its base is part of the cliff.

The cove is formed by a slight receding and breaking down of the cliffs, and is two hundred and sixty yards from the points of entrance to the broad, sandy beach forming the head of the cove. The southwestern point of the entrance is formed by two rocks which are respectively ninety and one hundred feet high; the eastern point is a slight projection of the main cliff at the southward. Between this point and the southwestern rock the distance is two hundred and sixty yards. From shore this cove looks as if there were good anchorage for a small vessel.

Heceta Head, Northward.—From the edge of the cliff at Heceta Head, just behind Conical Rock, at an elevation of three hundred feet, a line passes tangent to Cape Perpetua at the distance of nine miles, and sees the extremity of Cape Foulweather at about the same elevation bearing north seventeen degrees west (N. 17° W.) at thirty-eight miles. This line passes inside the buoy moored off the Alseya River at sixteen and three quarters miles; half a mile outside Seal Bluff at twenty-one and a half miles; inside the whistling buoy off Yaquina Bay at twenty-seven and a half miles; and almost tangent to the Yaquina Head Light-house at thirty-two and one sixth miles. This long stretch of shore-line is so nearly straight that at Alseya River the eastern recession is only three-quarters of a mile, and at the mouth of the Yaquina not quite one mile.



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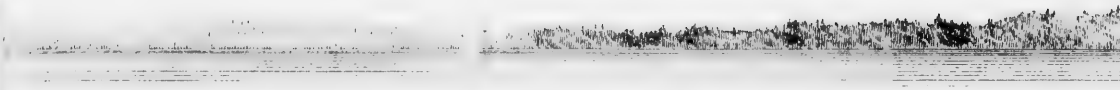

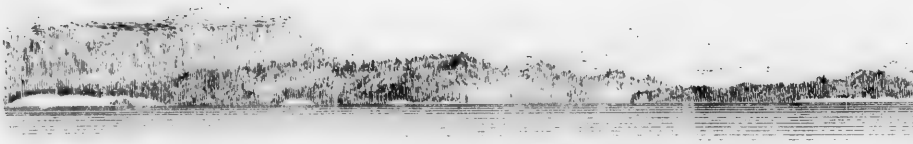

Sand dunes.

Stream from Tsilkoos Lake, E. ½ N., 13 miles.

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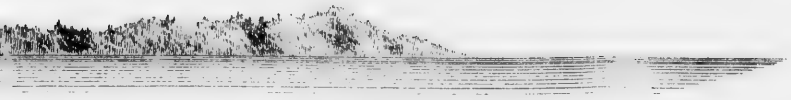
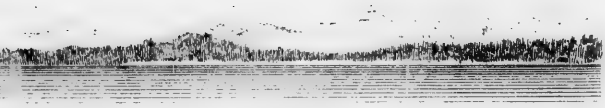
Cape Perpetua, N. by W. ½ W., 8 miles.

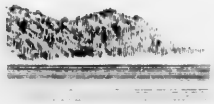


Cape Gregory, SE. by S., 22 miles.



s Lake, E. ¼ N., 13 miles. Line of sand dunes, under high ground.

Cape Perpetua, NE. by E. ¼ E., 10 miles.



CAPE PERPETUA.

Nine miles northwestward from the westernmost part of Heceta Head is situated the westernmost and highest point of Cape Perpetua. The westernmost and middle part of this cape lies south thirteen and one-half degrees west (N. 13½° W.), thirty-six and one-fourth miles from the south point of the Umpquah River. This line clears Heceta Head by only one-fourth of a mile. The shore-line between Heceta Head and this cape has a general direction north by west one-quarter west (N. by W. ¼ W.). It consists, near the former, of sloping, sandy cliffs, forty to one hundred feet high, bordered by a broad, low-water beach and backed by a narrow strip of clear land and then by dense fir forests. Along this cleared land are several farm-houses. Two miles after leaving the head the cliffs change to higher, rocky, broken cliffs, with a slightly irregular projection from the straight trend of the coast, that reaches one hundred and forty feet elevation. Off this rocky stretch there is no low-water beach and the ledges of rock run out beyond low water, but there are no known outlying dangers.

The hills within less than half a mile of the shore reach eight hundred and fifty feet elevation and are heavily wooded. In many places forest fires have left nothing but large areas of burnt trees still standing.

Ten-mile Creek, a stream thirty yards in width, opens upon the sea five miles northward of Heceta Head. It is marked by a sand beach nearly a quarter of a mile long to the south. The stream is very short, and comes from the ocean flank of the mountains behind Heceta Head and Cape Perpetua. In the dry season the mouth is closed.

The southern part of the cape commences at six and one-fourth miles northward from Heceta Head at a cliff one hundred and sixty feet high with two large houses on the south side. The face of the cape from this cliff, and including the hill north of the Yachats, embraces five miles. This southern part of the cape is a jutting spur, long and grassy, terminating in rocky cliffs. Behind it the land rises to eight hundred feet in three-fourths of a mile, and is covered with burnt forests. A mile and three-quarters to the northward of this is the first high, grassy head backed by fir forests. This head reaches one thousand feet in elevation in three-eighths of a mile; it projects so as to form a rather sharp recession of the shore on the south face, and an irregular cove on the north side. This head has half a mile frontage and just south of it enters a small stream through a wooded valley from the northeast. Two or three houses lie under its south flank. The boldest part of Cape Perpetua lies three-quarters of a mile northward of the last mentioned projection, but has not so broad a face; there is a slight receding of the shore of about one-fourth of a mile between them, where the valley ends in rocky cliffs surmounted by fir trees. This head hardly projects farther than the head to the southward of it, but it is bolder and reaches eight hundred feet in elevation in one sixth of a mile from the sea, and the four hundred and fifty feet elevation almost overhangs the water. The face of the cliff of this northern head was so red that it was called Red Bluff in the reconnaissance of 1869. The descent from the summit to the cliff line is regular although steep; and close under its face are some flat rocks awash at low water.

The base of the cape is composed of a series of flat ledges of rock which extend outward from the foot of the cliffs, but cut by deep crevasses into which the sea rolls at all times. The face is rocky and bare, and almost vertical near the water; it rises to seven hundred feet elevation at three hundred and fifty yards from the shore-line.

The high shore commencing one and one-quarter miles north of the north head of the cape, and separated therefrom by the sharp valley of the Yachats River, will usually be taken for part of the cape when seen some distance from seaward. The length of this Yachats Head is nearly one and a quarter miles and it falls slightly back with a narrow mesa front a hundred feet above the sea, and then rises wooded to six hundred feet elevation in half a mile. On the mesa are several large farm-houses. When the navigator is abeam of this head, he will note the sharp depression of the valley of the Yachats.

All these projecting points have ledges of rock running beyond low water. There is no beach.

Just north of the cape the shore falls back a quarter of a mile, with rocky cliffs on the sea, and a broad low-water sand beach while the fir forest approaches the shore.

There are no known hidden dangers off this head or off the coast for some distance north and south.

Under the southern part of Cape Perpetua, Tebenkoff lays down a small stream which he calls the Zastikin River; this may be the Ten-mile Creek.

We passed this cape within two miles and sketched it, and observed the latitude when ... abreast of it.

The geographical position of the head, as determined by the U. S. Coast and Geodetic ... vey, is:

Latitude	44	47	23″	north.
Longitude	124	05	10″	west.

The magnetic variation was 20° 30′ east in January, 1885, with an annual increase of ... minutes.

From the cape we have the following bearings and distances to prominent objects:

Cape Orford Light-house	S.	E.	90 miles.
Cape Gregory Light-house	S.	E.	59 miles.
The Bar of the Umpqua River	S. 13°	E.	37¾ miles.
Yaquina Whistling Buoy	N. 18	W.	1⅞ miles.
passing over Alseya Buoy at 7¾ miles.			
Yaquina Heads Light-house	N. 17	W.	23¼ miles.
This line passes half a mile outside of Seal Rocks at			12¾ miles.
and one mile outside of Yaquina River at			20 miles.
Tillamook Rock Light-house	N. 18	W.	98 miles.
Cape Disappointment Light-house	N. 19	W.	119 miles.

This cape was named by Cook in March, 1778; its position was approximately laid down ... Vancouver, who had southerly weather when he passed it in April, 1792. Tebenkoff retained ... name; and the Coast Survey reconnaissance of 1850 marks it very prominently.

The Yachats River breaks through the high coast hills near Cape Perpetua, and has a narr... mouth between rocky cliffs.

This is a good sized stream but the cañon is narrow and heavily wooded for five or six ... from the mouth, when it widens and the valley is settled. There is a wagon road through ... cañon from the mouth. The Yachats is fordable in summer, and navigable only for canoes. ... the south side of the Yachats is the main front of Cape Perpetua; on the north side is the ... spur, six hundred feet above the sea, and coming from the heavily forested Yachats Moun... which lies four and a quarter miles north thirteen degrees east (N. 13° E.) from the extrem... the cape; and four and a half miles south thirty five degrees east (S. 35° E.) from the south ... of the Alseya entrance; is twelve hundred feet above the sea and only one and five-eighths ... in from the shore. The face of this spur slopes to the south southwest; its higher part is cov... with fir forests, and its seaward part is a mesa land of moderate breadth, marked by sev... large buildings.

As we passed this in 1869, there were two villages, near the stream, comprising the ... agency of the Alseya Indian Reservation, where were gathered about two hundred and ... Umptquah and Koos Indians who had several hundred acres of land under cultivation. T... buildings have since been removed to the Siletz Reservation north of the Yaquina River.

For one and a quarter miles north of the Yachats, the shore-line is a broken rocky ... thence to the Yaquina River the shore line is low, bordered by a sandy beach, and backe... fir forests. This shore-line is broken by the entrance of the Alseya River and by the cliffs ab... the Seal Rocks.

Tebenkoff lays down the Naspi River just north of Cape Perpetua, in the place of the Yach... On recent State maps of Oregon the stream is called Yahats.

Cape Perpetua to Alseya River.—Along this portion of the coast the cliffs are from fifte... thirty feet high, with a narrow strip of grassy land behind them that ranges from a quart... a mile to a mile broad. This open land is backed by heavily wooded ridges.

THE ALSEYA RIVER.

Two and a half miles north of the Yachats head of Cape Perpetua, the shore changes ... the bold, rocky-faced grass plateau of the Yachats to a low bluff only ten to forty feet high ... a broad sand beach bordered with forest almost to the water's edge. The low-water beach is ... broad.

The country inside is low, flat, and covered with forests.

There is some mining along the beach where the auriferous sands are worked.

Eight miles north by west from the cape is the entrance to the Alseya River, of which ... south head is an abrupt, long, rounding cliff of sandstone, of less than one hundred feet hei...

and covered with trees; the north point is a broad, low, sandy point, three-quarters of a mile long and covered with driftwood. The entrance to the river is one-quarter of a mile wide at the narrowest part.

Inside the river, the bluff continues on the south side, and the hill, nearly one mile from the south point, is one hundred feet high. On the north side the sandy point changes, at a little over a half mile, to bluffs which reach two hundred and twenty feet at a short distance back. One mile east of the bay the wooded hills reach seven hundred feet elevation.

One mile from the north side of the entrance to the river, the outer shore-line changes to an abrupt rise forming the commencement of a long line of sand dunes, which extend for three and a quarter miles to Seal Rocks. These dunes change to a bluff, forty or fifty feet high, and it is bordered by a broad sand beach, with a broad low-water beach. Inside the sand dunes the country rises to four hundred and five hundred feet and is heavily wooded, but in part burnt.

At the examination of the entrance to the river in 1869, it was about one hundred yards wide at low water, with no well defined channel, and had a depth of five or six feet of water on the bar. One mile and a quarter inside the entrance, the river expands into a bay about one mile wide and one and five-eighths miles long; it is filled with sand flats, but is reported to have a tortuous channel through them.

On the north side, or right bank of the Alseya Bay, is the small town and post office, Collins. It is one-quarter of a mile inside the entrance, and has a salmon cannery, wharf, and half a dozen buildings.

One mile above Collins there is another wharf, salmon cannery, and several buildings.

On the south side, or left bank of the river, about a mile above the mouth, is the town and post-office of Waldport. It has a steam saw-mill with a capacity of eight thousand feet of lumber daily, two short wharves, and about ten houses.

All along the course of the river are the houses and farms of settlers.

The head of tide water is reported to be about ten miles from the mouth.

The steam schooner *Mischief*, of sixty tons, runs between Yaquina Bay and Alseya River, twelve miles from entrance to entrance. The residents claim that there is eight feet of water on the bar; but the state of the tide has not been ascertained.

The sloop *Fanny*, drawing six feet of water, crossed and recrossed the bar in 1861, 1862, and 1863.

In 1879 the examination showed that the bar then had a little less than eight feet of water upon it, and was four hundred yards long and only one hundred yards wide between the six-feet curves to the north and south. The breakers mark the channel in moderate weather; in strong winds the bar breaks. The outer part of the bar lay three quarters of a mile to the west-northwest of the south point; but like all these bars the position and the depth of water must change irregularly. The deepest water in the entrance inside the bar between the north and south spits is forty feet. In the topographical reconnaissance of 1887 the bar lay three-eighths of a mile off the south shore, and the first course in between the north and south breakers was northeast.

A buoy has been placed at the mouth of the Alseya to mark the approaches to the entrance. It is a *first class can-buoy, painted with black and white perpendicular stripes*, and is placed in eleven fathoms of water one and one-seventh miles broad off the shore. It lies nearly southwest one-half west (SW. ½ W.) from the entrance to the river, and may be passed on either side.

In 1887, from this buoy, the bar laid about five-eighths of a mile east by north. The buoy was located by the following bearings and distances:

Seal Bluff	N.	7° W.	4¼ miles
Hillock, inside north sand point	N.	36° E.	1⅝ miles.
Cluster of houses, three-quarters mile south of entrance	S.	72° E.	1⅛ miles.
Extremity of Cape Perpetua	S.	18° E.	7⅝ miles.
Whistling Buoy off Yaquina River	N.	18° W.	11 miles.

The buoy lies five miles north twelve degrees west (N. 12° W.) from the outer and largest Seal Rock.

The geographical position of the hillock half a mile inside of the north point of the entrance to the river, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	44°	26′	13″	north.
Longitude	124°	04′	45″	west.
Or, in time	8h	16m	19s.	

It is almost exactly in the same longitude as the Yaquina Heads Light-house.

Broad off the mouth of the Alseya River there is a depth of seventy fathoms of water over sandy bottom at eighteen miles from shore. Tebenkoff gives a depth of seventy-two fathoms at eight miles off shore. At one mile the depth is ten fathoms.

An indentation of the shore line is noted in this position by Vancouver, with sunken rocks to indicate breakers. He probably saw the bar breaking. It is copied by Tebenkoff, who adds, however, the river Alizia.

Landfall.—Alseya Peak is a notable peak about two thousand feet elevation lying only eleven miles northeast by east (NE. by E.) from the mouth of the Alseya. Behind it lies Mary's Peak on nearly the same bearing, twenty-four miles from the mouth of the Alseya, and reaching three thousand eight hundred and sixty eight feet elevation.

Alseya Peak is a flat-topped mountain, covered with dead fir trees, and presents a whitish appearance; when a new growth of forest trees covers the mountain this peculiarity will probably disappear. The mountain is a good landfall for the coast in this latitude when Mary's Peak is in clouds or obscured by smoke.

Alseya River to Seal Rocks.—Along this stretch of coast-line there is a broad, smooth, sand beach which is backed by low bluffs; the rolling country inside is densely wooded.

North of the Seal Rocks there is a broad, smooth, sand beach, which is backed by cliffs that are from forty to one hundred feet high; then rolling hills and ridges covered with dead gray trunks of burned trees.

The Seal Rocks.—From the mouth of the Alseya River to the mouth of the Yaquina River the distance is eleven and a half miles. The shore-line is nearly straight on a north by west quarter west (N. by W. ¼ W.) course. For three miles it has a low, sandy beach, backed by sand dunes for half the distance and then by a bluff sixty feet high; and inside of these the forests cover the rising hills. This sand beach abounds in "black sand" (magnetic iron ore), which is accompanied by very fine gold which was formerly obtained therefrom by treatment with quicksilver. The rocky shore commences at a little over three miles from the Alseya. The jagged bluffs range from seventy to one hundred feet high, and for more than a mile the shore is bordered by a cluster of low rocks which reach nearly half a mile off the beach. These are the Seal Rocks.

The most projecting of the rocky bluffs is in latitude 44° 29′ 47″ north. It is twenty-three and a half miles from Cape Perpetua, and ten and five sixths miles from Yaquina Heads Light house.

The largest of the Seal Rocks is not covered at high tide, and lies about one third of a mile from the beach. These rocks were formerly the resort of seals and sea lions. The Indians are reported to sometimes catch large numbers of codfish off these rocks, and in 1868 a fishing station was established here. The fishing-grounds extend three miles outside the rocks, but the locality has not been examined.

There are no known hidden dangers off these rocks.

From half a mile abreast of the outermost part of this bluff, the buoy off the Alseya River bears south twelve degrees east (S. 12° E.), distant four and three fourths miles, and the Whistling Buoy off the Yaquina bears north twenty four degrees west (N. 24° W.), distant seven and one-third miles.

The cattle farm of the Alseya Reservation (now opened to settlement) lies behind the shore abreast the southern part of the Seal Rocks.

Alseya Mountain, already described, covered with dead trunks of trees, is visible from the Seal Rocks; it bears east by north (E. by N.) twelve miles therefrom.

From the Seal Rocks to the mouth of the Yaquina River the shore is a comparatively low bluff bordered by a broad sand beach, and heavily wooded to within a mile and a half of the Yaquina, when sand dunes begin and continue to the entrance. The country behind is moderately high and is covered with forests, but in many parts extensive fires have destroyed but the larger trunks which are still standing.

A small stream called *Beaver Creek* enters the ocean about one mile and a half northwest from the outermost bluff of Seal Rocks and six miles south by east from Yaquina point. The stream is twenty yards wide at the mouth and is said to abound in fine trout. The geographical position of the mouth of Beaver Creek is:

Latitude	44	31′ 23″ north.
Longitude	124	04′ 40″ west.

All along this shore to the mouth of the Yaquina are the houses of settlers.

Landfall.—The landfall for the coast stretching from Heceta Head to Yaquina Point is *Mary's Peak*, situated about twenty-four miles inside the shore-line. The sides of this prominent mountain are covered with timber, but immediately on the summit it is grass-covered.

The approximate geographical position of this mountain is latitude 44° 29′ north, longitude 123° 29′ west, and as its elevation is over four thousand five hundred feet it should be seen at a distance of seventy-five miles. It lies directly east from the entrance of the Yaquina River, but should be most distinctly seen when looking up the valley of the Alseya River.

In June, 1868, this mountain-top was still covered with the snows of the previous winter. This fact will probably explain some of the accounts of the early navigators. In October, 1877, we ascended the mountain and had a view of the ocean therefrom. It is in the main coast range which rises sharply from the Willamette Valley. A great spur strikes from this range a few miles north of Mary's Peak and reaches the coast between the Alseya and the Yaquina Rivers. The Alseya Mountain is part of this cross range.

When Cook was at an estimated distance of nine leagues off the coast just north of Cape Perpetua (on the northern part of the Heceta Bank in ninety fathoms) he made a view of the high mountains east of the Yaquina and Alseya Rivers. From his view and description it would seem that he saw Alseya Mountain and Mary's Peak nearly overlapping each other, and named the landfall "Table Hill." His weather was unfavorable.

There are three other isolated peaks inside this short stretch of coast between Cape Perpetua and Yaquina Heads: The *Yachats Mountain*, probably two thousand feet in height, about six miles north-northeast (NNE.) from Cape Perpetua; *Alseya Peak*, estimated about two thousand feet high, thirteen miles north-northeast (NNE.) from the cape, and directly abreast the mouth of the Alseya River (See page 410); and *Elk Mountain*, on the Yaquina River, estimated to be about two thousand feet high, lying thirteen miles east by north (E. by N.) from Yaquina Heads Light.

YAQUINA RIVER.

When to the southwestward of the mouth of the Yaquina River the high land of Cape Foulweather is seen projecting well outside the double head of Yaquina Point. These heads are pyramidal in form and covered with grass—they are not repeated on the coast; the low, black, rocky point just outside of them, and upon which the Light-house is erected, shows almost under the highest part of Cape Foulweather. A line of broken yellow cliffs, varied by sand patches, runs from Yaquina Point southward for three miles, and ends in the plateau forming the north point of the Yaquina entrance.

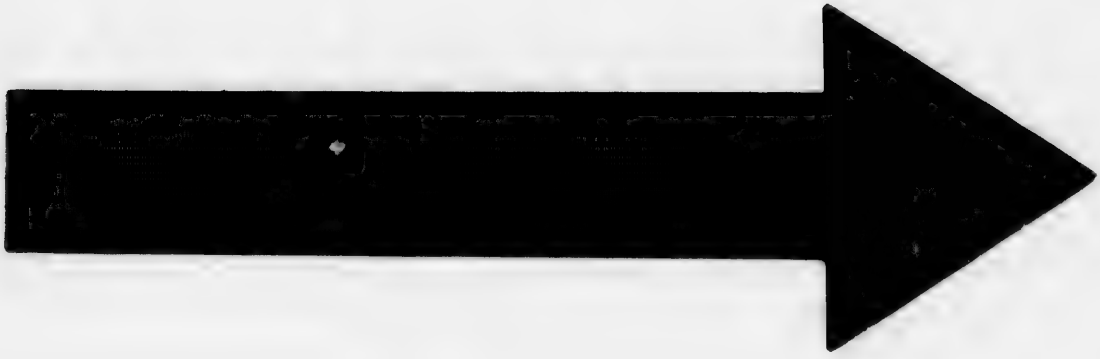
The North Point of the entrance to the Yaquina River is less than half a mile broad, and almost a mile long; its seaward shore runs north by west (N. by W.), and the bluffs are composed of hard sand and soft rock, from one hundred to two hundred feet in height, backed by high, broken hills covered with forest. Inside the entrance the shore runs to the north and then curves eastwards the east for two miles, when it trends sharply to the south for three miles.

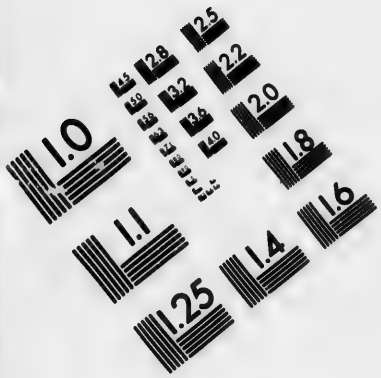
The point is a bold, sandy cliff, one hundred and twenty-six feet in height, with a clump of pine trees on the top near the extremity. Formerly (1868) a Light house stood on the highest part of the extremity of the point. The geographical position of this former fifth-order light was latitude 44° 37′ 25″ north, longitude 124° 03′ 43″ west. It was discontinued October 1, 1874, but the structure still remains and is used as a day-mark. It consists of a tower rising from the middle of the dwelling and painted white. It stands at a height of one hundred and twenty-eight feet above the sea.

From the north point a sharp, narrow line of reef stretches southward on the prolongation of the outer shore for four hundred or five hundred yards. The outer end of this reef is a rock awash.

The south side of the entrance is a line of broad sand beach and a narrow line of sand dunes which rise to forty feet in height. Behind the sand dunes are grassy hillocks rising to eighty feet in height under the line of forest which covers the ridge hence to the southward. This ridge rises in pine covered hillocks of about three hundred feet elevation, and stretches inland four or five miles to the base of the coast mountains which are heavily forested to their summits; but large areas show the effect of great forest fires.

The south point itself is long and rounding, and lies inside the line of the north point so that the narrowest part of the entrance lies between the eastern side of the north point and the northern extremity of the south point. This narrowest part was five hundred and sixty yards wide in the survey of 1868.





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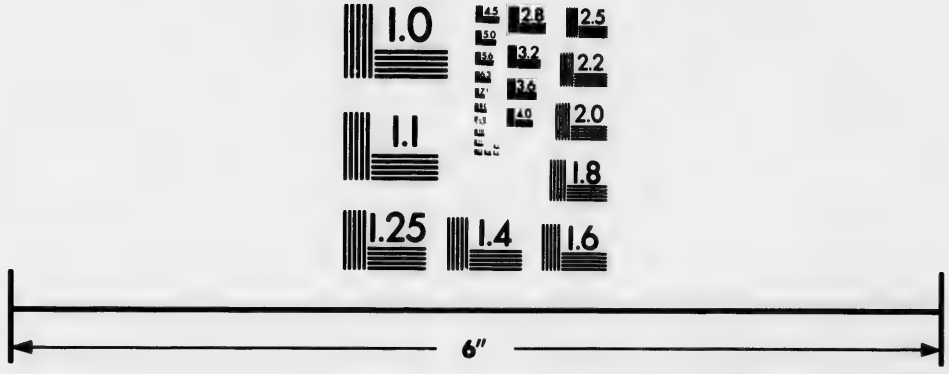

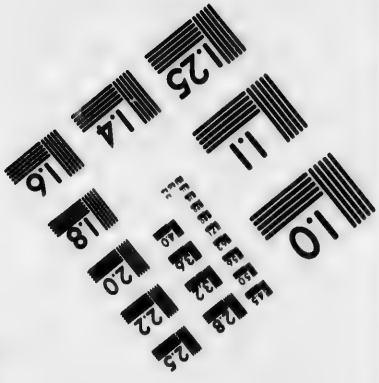

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Near the extremity of the South Point is a grassy knoll, bare of trees, and one hundred and fifty-eight feet high, upon which was erected a flag staff. The high-water mark of the extreme end of the South Point was four hundred and forty yards north-northwest from this knoll in 1868.

THE YAQUINA REEF.

Broad off the entrance to the Yaquina River there is a long, narrow line of sunken rocks lying parallel with the shore-line at a distance from one half to one mile. Immediately off the mouth of the river the reef is more than a mile long, sharp, narrow, and dangerous, as it is on the crest of a sub-surface dike of rock reaching to within six feet of the surface in some places. There are two or three narrow passages through it where a vessel might carry four fathoms of water if she were absolutely forced to try the passage.

The soundings clearly indicate that this reef stretches more than half-way to Yaquina Point with depths of less than four fathoms in places. It also shows itself nearly two miles to the southward in a patch of foul ground one-quarter of a mile in extent with as little as twelve feet of water on some of the rocks, and depths of nine fathoms on the outside and six to eight fathoms on the inside. The depth inside the whole line of this reef is from eight fathoms to four fathoms, and with a channel only one quarter of a mile wide between the three fathom curves.

This reef, which forms such a danger to the approaches of the river, nevertheless serves as a natural breakwater against the heavy westerly seas, which would otherwise render the bar much more difficult to pass except in very smooth water.

It is reported that the pilot-tug has been able to cross the bar when the whole line of this reef, from the detached patch to the southward, across the entrance, and as far as the detached lumps half-way to Yaquina Point, has been breaking badly in the westerly swell.

The southern part of this reef is the rocky patch, already referred to, of one quarter of a mile square and having as little as twelve feet of water upon it. It breaks in heavy weather. It lies two and one-eighth miles south-southwest (SSW.) from the highest part of the North Point, and one mile from the beach to the eastward of it. The three-fathom passage between it and the beach is half a mile wide. There is a depth of ten fathoms close under its south side, nine fathoms close off the west side, and four to five fathoms on the north. Vessels can pass between it and the southern end of the principal barrier, but should keep well up toward the outer buoy which marks it, because there is as little as three and a half fathoms in one or two spots a trifle more than three-eighths of a mile south of the barrier.

The south end of the principal reef or barrier, with only thirteen feet of water, lies one mile south thirty-five degrees west (S. 35° W.) from the North Point of the entrance, and one and one-third miles south sixty-two degrees west (S. 62° W.) from the flag-staff on the South Point, which is one hundred and fifty-eight feet high. From this south end the direction of the reef is north by west (N. by W.) for one and one-quarter miles in a straight, narrow line, with an outlying twelve-feet patch one-quarter of a mile west of the north end. Through the northern part of the barrier a vessel might pass in three to six fathoms of water, but just abreast of this opening the channel inside and parallel with the shore contracts to less than a quarter of a mile, with three fathoms through it, but only sixteen to eleven feet on its shore side to nearly abreast the North Point. The northernmost part of this reef, in seventeen feet of water, lies seven-eighths of a mile north sixty-eight degrees west (N. 68° W.) from the North Point of the entrance and three-eighths of a mile from the breakers along the broad, low beach. This shoal spot lies on the line of the Old Light-house on the North Point and the flag-staff (Beacon A) on the knoll of the South Point.

Between this northern part of the barrier and Yaquina Point there are several spots which have less than four fathoms of water on them, but the general depth is six to nine fathoms over rocky and gravelly bottom. In the early hydrographic examination between the Reef and Yaquina Point only a few lines of soundings were run, and spots of three and a quarter fathoms were found, but fishermen have reported that broad off the shore, and half-way between the North Point of the entrance and Yaquina Point, they had fished on a large sunken rock having over twenty feet of water upon it at high water.

Immediately outside the reef the depth of water is six fathoms over sandy bottom, with fifteen fathoms of water at one mile, and twenty-five fathoms at two miles, over sand and shells.

Inside the reef there appear to have been some great changes in the width of the passage parallel with the shore. In 1868 and 1869 the three-fathom line outside the entrance of the river was about five hundred and thirty yards east of the line of the reef or barrier; in 1880 it was

hundred yards away; and in 1885 it was only four hundred and forty yards. Unless there is a strong littoral current to the northward or southward from the river entrance the material brought out by the river must have a tendency to gradually shoal the space between the shore and the reef.

The mark for the south end of the principal reef or barrier is the Outside Bar-buoy, a black can buoy of the first class, lying about one-quarter of a mile southwest from it, and elsewhere described. This position of the buoy is on the line of the old light-beacon on the North Point and the south end of the reef, and is elsewhere described.

The Entrance to the river through the outer sands has been subject to great changes. Sometimes the channel ran directly seaward; at one time it ran close under and along the shore of the South Point, and then the patch of sunken rocks (lying one third of a mile off that shore and one mile south of the point), which is usually covered up with sand, was found in the middle of the channel. The bar was reported smoothest in June, July, and August, probably because the outside reef breaks the force of the swell of the Pacific from the west northwest. The velocity of the current between the heads, when the channel-way was restricted to one-third the distance across, as at or near low water, was estimated at five or six miles per hour; a well manned whale-boat could not pull against it. The greatest depth of the water was then six and three-quarters fathoms. On the bar, at the same time, the depth was nine or ten feet, but the bottom was very irregular.

In order to control the channel, and give the maximum depth of water upon the bar, the Government of the United States has been carrying out a project to build a brush and stone jetty to the level of high tide about thirteen hundred and thirty-three yards long on the south side of the entrance, to close the rock-obstructed channel and force the ebb against the reef which stretches from the North Point. This was estimated to give a central free channel of the least depth of twelve feet. In 1885 this jetty had been extended nearly seven hundred yards from the South Point on a southwest course, but not yet out to the line of the ocean shores. There were then, as before the work, two channels; one passing to the northwest and one to the south by east. In June, 1885, there was a depth of but nine feet on the bar, which was an increase of depth over the natural bar, but a decrease from the previous year. In the spring of 1887, there was reported to be a depth of eighteen feet on the bar at high water, and the south channel ran nearly straight out to the southwestward.

Inside the Entrance to the Yaquina the bay expands to more than a mile in width for two and a half miles when the river proper enters at the southeast angle with a width of six hundred yards. It comes from the east northeast for about twenty miles in a straight line; its headwaters almost reach the headwaters of the tributaries to the Willamette River. As seen from Mary's Peak in 1877 the whole country which the river traversed, and far to the northward and to the southward, was marked by forests burned in the great forest fires of 1868.

The bay exhibits more than two-thirds its area as bare flats at low water; but a good channel is clearly marked through them, so that vessels able to cross the bar may be taken up the river. The channel is well marked by buoys.

Newport is the name of the thriving town situated on the inside of the North Point; it is the port of entry for the collection district of Yaquina Bay, and a seaside resort for people from the interior. *Yaquina City* is situated on the right bank three miles from the entrance and at the mouth of the river proper. It is at the terminus of the Oregon Pacific Railroad, seventy-two miles in length hence to Corvallis in the Willamette valley. A large wharf and extensive warehouses are built here, and the steamers load and discharge passengers and freight. *Oysterville*, on the right bank of the river, is five and a half miles from the entrance; and *Toledo*, on the same bank, is ten and a half miles from the sea.

The traffic to Yaquina Bay is mainly carried in steamers. For the three years ending 1885 one hundred and ninety-five vessels had entered. One of these is the steamer *Yaquina City*, which draws more than twelve feet of water, and makes regular trips to San Francisco. In 1887 this traffic had been very largely increased. There were then three steamers making regular trips to San Francisco, and a tug boat kept permanently employed for pilot service on the bar.

Aids to Navigation.—The following are the aids to navigation for the entrance and bay of the Yaquina. It must, however, be understood that changes are made when the bar and channels change, and *no vessel should enter without a pilot* having a thorough knowledge of the hidden dangers.

Yaquina Heads Light-house on Yaquina Point.—This light is for the approaches and is fully described on page 419. This light is sometimes erroneously designated the Cape Foulweather Light.

The Whistling Buoy.—This is an automatic whistling buoy, painted *with black and white perpendicular stripes.* In April, 1887, it was placed two and a quarter miles outside of the entrance in fifteen fathoms of water. From this buoy the Yaquina Heads Light-house bears north one-eighth west (N. ⅛ W.), distant four and three-quarter miles; the Old Light Beacon on the North Point northeast half north (NE. ½ N.), distant two and a third miles, and the Outside Bar Buoy northeast three-eighths east (NE. ⅜ E.), distant one and three-sixteenth miles. It may be left on either hand in entering. In August, 1887, it was in the same position.

It now lies two and three-tenths miles southwest three-quarters west from beacon C.

The Outside Bar Buoy.—This is a *first class can buoy, painted black and numbered* **1**. It was formerly one and one-fifth miles south seventy degrees west (S. 70° W.) from the outer end of the jetty on the south side of the entrance to the Yaquina River, but has recently been moved to a position three-quarters of a mile south seventy-five degrees thirty-six minutes west (S. 75° 36′ W.) (true) from the outer end of the jetty. (August, 1889, depth of water and character of bottom not stated.)

It is one-eighth of a mile south from the south end of the reef.

From this buoy the Yaquina Heads Light-house bears north by west one-fourth west (N. by W. ¼ W.), distant four and one-sixteenth miles; the Old Light Beacon on the North Point north thirty degrees east (N. 30° E.), distant one and one-quarter miles; the Flag-staff on the South Point hillock (known as Beacon A) north fifty-six degrees east (N. 56° E.), distant one and three-eighths miles; and the Bar-buoy northeast one-quarter east (NE. ¼ E.), distant a little less than one mile.

This places the buoy one-quarter of a mile outside the three-fathom line. In 1886 the bar and channel lay on the line to the Flag-staff on the South Point Knoll.

The Bar Buoy.—This is a *third-class can-buoy, painted black* and *numbered* **3**. It is placed inside the bar in three fathoms of water over hard sandy bottom. To the northwest of this buoy are the rocks awash at low water which mark the extremity of the reef reaching from the North Point. The buoy lies nearly one-eighth mile broad off the northwest face of the jetty, and nearly abreast the seaward end.

From this buoy the following bearings and distances are given: Old Light Beacon on the North Point bears north by west (N. by W.), distant nearly half a mile; the Flag-staff on the South Point (Beacon A) east by north (E. by N.), distant half a mile; Red Buoy No. **2**, northwest by north one-half north (NE. by N. ½ N.), distant one-half of a mile. Red Buoy numbered **2½**, opposite Newport north by east one-half east (N. by E. ½ E.), distant a trifle over five-eighths of a mile.

Old Light Beacon.—This is the old light-house structure on the North Point of the entrance to Yaquina Bay and consists of a tower rising from a dwelling, both painted white. The structure stands one hundred and twenty-eight feet above the sea. The light has been discontinued. The geographical position of this old Light-house has already been given (page 413); from it the Yaquina Heads Light-house bears north twenty-nine degrees west (N. 29° W.), distant three and one-quarter miles; and Cape Perpetua bears south fourteen degrees east (S. 14° E.), distant twenty and one-sixth miles.

Beacon A.—This is a *white pyramid* surmounted by a flag-staff and located on the highest part of the knoll near the extremity of the South Point. This beacon has been referred to as the Flag-staff on the South Point. It is one hundred and fifty eight feet above the sea, and bears south sixty-seven degrees east (S. 67° E.), distant five-eighths of a mile from the Old Light Beacon on the North Point.

This Beacon is used to form ranges with Beacons B and C to locate the southern limit of the reef running from the North Point, and the rocks, now in the sand, but which were at one time in the south channel close under the south beach. From this Beacon A the Beacon B bears west one-eighth south (W. ⅛ S.), distant three hundred and fifty yards; and Beacon C bears southwest one-eighth west (SW. ⅛ W.), distant five hundred yards.

Beacon B.—This is a *white pyramid* inside the beach near the inner end of the jetty, and it forms a range with Beacon A to note the southern end of the rocky reef making out southward from the end of the North Point. From this Beacon Beacon A bears east one-eighth north (E. ⅛ N.), distant three hundred and fifty yards; and Beacon C bears very nearly south (S.), distant about three hundred yards.

Beacon C.—This is a *white pyramid* inside the sand beach, and forms a range with Beacon A to note the position of the rocks off the south beach which are now well inside the six-feet curve at low water, but which were at one time in the channel when it ran close under the south beach

(1868-'69). This beacon is five hundred yards southwest one-eighth west (SW. ⅛ W.) from Beacon A.

A *day beacon* has been placed on the outer end of the jetty at the south side of the entrance to the bay.

The Newport Buoy.—This is a *third-class nun-buoy, painted red* and *numbered* 2½. It is placed in twenty feet of water near the sand flat on the east or starboard side of the main ship-channel opposite Newport. The channel here follows under the northwest shore of the bay and curves round to the northeast, east, and southeast with it. Abreast of this buoy the channel is about one hundred and fifty yards wide between the three-fathom curves, and has five fathoms of water in it. About two hundred yards beyond this buoy, and directly opposite the main part of the town of Newport, a broad channel with only eight or nine feet of water in it in some places branches off to the eastward and runs through the middle of the bay for three-quarters of a mile, when it again joins the main channel.

The *red buoy* numbered 2½ has been placed in the position half a mile (one thousand and ninety yards) north three-eighths west (N. ⅜ W.) from Beacon B.

From the Newport Buoy we have the following bearings and distances: Beacon B bears south five-eighths east (S. ⅝ E.), distant half a mile; Beacon A or Flag-staff, southeast by south half south (SE. by S. ½ S.), distant almost half a mile; and Point Virtue, the farthest point on the south shore and one hundred and forty feet high, bears east by south one-quarter south (E. by S. ¼ S.), distant one and one third miles.

Buoy on the north curve of the Middle Sands.—This is a *first-class spar-buoy, painted red* and *numbered* 4. It is placed in nineteen feet of water on the south or starboard side of the main ship-channel at the turn, and marks the northernmost point of the middle-ground between the two channels. Abreast of this buoy the channel is only about fifty yards between the three-fathom curves, and has from three and a half to four and three quarters fathoms of water in it. Beyond this buoy the flats extend from the north shore about one hundred and fifty yards to the edge of the channel.

From this buoy Point Virtue bears southeast by east one-eighth east (SE. by E. ⅛ E.), distant one and one third miles; and Beacon A, or Flag-staff, bears south half east (S. ½ E.), distant a little more than three-quarters of a mile.

Buoy on the Northeast side of the Middle Sands.—This is a *third-class nun-buoy, painted red* and *numbered* 6. It is placed in fifteen feet of water on the southwest or starboard side of the main ship channel, and marks the northeast edge of the middle sands. For the deepest water, three fathoms at low water, in the channel abreast of this buoy, it should be kept on the starboard hand about one hundred yards in passing it. Beyond this buoy for almost half a mile the channel shoals to seventeen and sixteen feet at low water until the junction of the middle channel running direct from Newport, when it again deepens to three and a half and four fathoms to the next buoy. The channel from abreast this buoy to abreast the next buoy runs through the middle of extensive flats on both sides straight southeast by east three-quarters east (SE. by E. ¾ E.) for one and one-sixth miles.

From this buoy Point Virtue bears southeast half east (SE. ½ E.) distant one mile; and Beacon A, or Flag-staff, south-southwest (SSW.) distant three-quarters of a mile.

Buoy off Coquille Point.—This is a *first-class spar-buoy, painted black* and *numbered* 5. It is placed on the northeast or port side of the channel, and marks the edge of the flats reaching out from Coquille Point. Abreast of this buoy the channel is about two hundred yards wide between the three-fathom curves, and has five and a quarter fathoms in it.

From this buoy Point Virtue is almost in range with Beacon A or Flag-staff and bears west half south (W. ½ S.), distant five-eighths of a mile; and the old Light Beacon on the North Point bears west one-eighth north (W. ⅛ N.), distant two and a quarter miles.

Beyond this buoy the channel narrows slightly and has a maximum depth of five and three-quarters fathoms over hard sandy bottom.

SAILING DIRECTIONS FOR APPROACHING YAQUINA RIVER ENTRANCE.

Vessels coming from the southward should first make Cape Perpetua, twenty miles to the southward of the mouth of the Yaquina. Cape Perpetua may be readily recognized by its broad ocean front, high broken cliffs, and higher, forest-covered heads. The Light on Yaquina Point will not be visible from a height of twenty feet until a vessel is within fifteen and a half miles of

the Entrance, or just before the mouth of the Alseya River is abeam. In clear weather the shore may be approached within a mile in ten fathoms of water. Approaching the river keep outside of the southern detached part of the Yaquina Reef at least one-third of a mile, with the whistling buoy about one third of a mile to the northwest, and then steer for the Outer Buoy which lies off the southern end of the principal part of the reef. If this Outer Bar buoy should be shifted by storms, as occasionally has happened, the Whistling Buoy is to be taken as the guide. Thence the courses are governed by the buoys and beacons already described. Sailing vessels should pass close to the Outer Buoy in ordinary summer winds, from northwest or west-northwest, so as to hold their course without tacking.

Vessels coming from the northward can safely pass Yaquina Point within a mile in fifteen fathoms of water, and then steer southeast by south half south (SE. by S. ½ S.) for four miles to the Outer Buoy.

Besides the landfall of Mary's Peak, already described, there is the lower peak of Elk Mountain, around the base of which the Yaquina River winds; it is thirteen miles east by north (E. by N.) from the Yaquina Heads Light on Yaquina Point.

Tides.—The Corrected Establishment, or mean interval between the times of the Moon's meridian transit and the time of high water, is XII^h 00^m. The mean rise and fall of the tides is six and one-tenth feet. At full and change of the Moon the high waters will be one foot higher than the average, and the low waters six-tenths of a foot lower. At the Moon's first and last quarters the high waters will be one foot lower than the average, and the low waters will not fall so low by six-tenths of a foot.

To find the time and height of every high and low water throughout the year at Newport take from the Pacific Tide Tables, published annually in advance by the U. S. Coast and Geodetic Survey, the time and height for Astoria and then for the time of high water at Newport subtract 0^h 45^m from the given time, and for the height subtract two-tenths of a foot from the given depth; for the time of low water at Newport subtract 0^h 45^m, and for the height subtract three-tenths of a foot. At Oysterville the high waters occur twenty-five minutes later than at Newport, and the low waters thirty-five minutes later; the heights are the same as at Newport.

THE YAQUINA HEADS, OR YAQUINA POINT.

This double-headed point lies three and three-tenths miles north thirty-four degrees west (N. 34° W.) from the North Point of the Yaquina. It makes squarely out about one mile from the general direction of the shore-line, but on account of the greater height and projection of Cape Foulweather to the northward, it is not seen as a prominent headland except to vessels close inshore. The shore from the entrance of the Yaquina River is a line of broken, yellow cliffs, principally bordered by a broad, low-water sand beach, and in the northern half by a narrow sand beach at the base of the bluffs at high water, but this beach ends abruptly at the northeastern angle of the cove under the Heads. Near the southern end of the high-water sand beach, about midway between the North Point of the Yaquina River and Yaquina Heads, there is a small cascade over the edge of the bluff where it is about one hundred feet high. The land behind this shore rises to two hundred feet within a quarter of a mile and is covered with forests. Further inland the country rises to high hills covered principally with dead trunks of the burned forest.

The southern shore-line of the point lies about west-southwest and east-northeast and is very rough and rocky except at the inner part. The extremity is comparatively low, reaching eighty feet at the Light-house. It is broken and very rocky, but the dangers immediately outside of it are not far off. On the north side of the point the cliffs recede to the east for seven hundred yards, and then sweep to the north as a high, broken shore based with sand and a narrow sand beach at low water. The narrowest part of the point, including the first head, is less than four hundred yards wide north and south.

The two "Heads," the distinguishing feature of this point, are two cone-shaped hills lying east by north and west by south from each other, or nearly parallel with the south shore of the point. They are grass-covered, which is a peculiar feature on this part of the coast. The outer one is three hundred and sixty feet above the sea, and four hundred and sixty yards almost directly east from the Light-house.

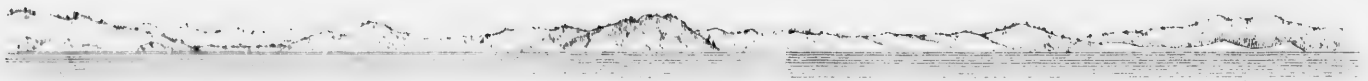
The second head is four hundred and seven feet in elevation and eleven hundred and ten yards eastward of the Light-house. The narrow saddle between them is two hundred feet above the sea, but as seen from the southward does not appear so depressed. Inside of the second head

Old Light-house. South Point, 158 feet

North Point, 126 feet. Yaquinna Bay

Cape Foulweather, N. by W., 14 miles. 360 feet. 407 feet.

Yaquinna Head Light-house, N. ¼ W., 8 miles.



Green slopes. Red spot. Green slopes. Mountain very distant.

Cape Foulweather, SE. by E. ½ E., 15 miles. Yaquinna Head, SE. ½ E., 20 miles.

the land falls sharply to one hundred and forty feet, but this depression does not show from seaward, as the point is projected on the higher land beyond. At one mile from the point the grass-covered land is changed to a dense fir forest, and the hills rise rapidly. From the south by east the point and the heads are seen well inside the projection of Cape Foulweather and under its highest shoulder.

Dangers.—Close under the rocky cliffs of the point lie several small visible and sunken rocks, but there are no known outlying dangers except the following: The first may be considered directly connected with the northwest part of the point. It is a small rock, nearly as high as the hills, three hundred and fifty yards northwest half west from the Light-house. The second danger is a patch of *sunken rocks* just half a mile northwest by north half north (NW. by N. ½ N.) from the Light-house. The third danger is a ledge in part visible, in part *sunken;* it is about two hundred yards in length, northeast and southwest, and lies nearly one mile north by west one-quarter west (N. by W. ¼ W.) from the Light-house. These dangers are all on the north side of the point.

Anchorage.—The hydrography has not been executed around and off the point, but a few soundings have been made under the point to indicate where anchorage may be had. These soundings show irregular bottom under the south face of the point, but there is a depth of nine fathoms as far out as the extremity of the point, decreasing to four fathoms at the anchorage, which is three hundred and fifty yards off the south cliffs when the Light-house bears northwest by west half west (NW. by W. ½ W.), distant two-thirds of a mile, and the inner head bears north by east (N. by E.), distant a little less than half a mile. The cliffs to the east are distant very nearly half a mile; and the three-fathom line lies four hundred yards to the eastward, with a broad line of breakers on the long, sloping, sandy beach.

In August, 1853, the astronomical party of the Coast Survey was very desirous of effecting a landing on or near this cape, but with a strong northwest wind the sea was rolling in too heavily to warrant the attempt. There was no appearance of a landing except in remarkably smooth weather. This opinion was verified by the party who subsequently made the examination, and reported that boat landing may sometimes be had on the south face of the rocks, but never on the beach. The materials for the Light-house were landed on the south face of the point about a quarter of a mile to the westward of the end of the low-water sand beach. At a later date a regular landing place was constructed nearer the end of the point for supplying the Light house, consisting of a chute and steps leading from the cliff down to the rocky beach below, and a windlass for hoisting.

THE LIGHT-HOUSE AT YAQUINA HEADS.

This is a primary sea-coast Light. The tower is very close to the cliffs at the extremity of Yaquina Point. Outside of it there are rocks for three hundred and fifty yards to the northwest. The structure is the frustum of a cone, painted white, surmounted with the lantern, parapet, and dome painted black. The base of the tower is eighty-one feet above the level of the sea. The keeper's dwelling, a two-story wooden building, painted white, is situated twenty-five yards to the eastward of the tower.

The light is a *fixed white light* of the first order of the system of Fresnel, and shows from sunset to sunrise. It was first exhibited on the 20th of August, 1873. It illuminates two hundred and forty-seven and a half degrees of the horizon, from southeast by east (SE. by E.), through the south and west to north by west one-quarter west (N. by W. ¼ W.). The height of the focal plane is one hundred and sixty-one feet above the level of the sea, and under favorable circumstances of weather the light should be seen from a height of—

10 feet at a distance of 15.1 miles.
20 feet at a distance of 19.6 miles.
30 feet at a distance of 20.8 miles.
60 feet at a distance of 23.5 miles.

The geographical position of the Light-house, as determined by the U. S. Coast and Geodetic Survey in 1885, is:

Latitude	44°	40′	35″.2 north.
Longitude	124°	04′	45″ west.
Or, in time	8h	16m	19s.0.

The magnetic variation, observed in May, 1885, was 20° 51′ East, with an annual increase of 1′.6.

In the published list of the Light-House Board this light is designated Cape Foulweather (Yaquina Head).

From this Light-house we have the following bearings and distances to prominent objects:

Cape Orford Light-house	S.	12°	E.	112½ miles.
Cape Gregory Light-house	S.	13°	E.	81½ miles.
Umpquah River	S.	13°	E.	59½ miles.
Cape Perpetua	S.	18°	E.	23 miles.
Cape Foulweather, Westernmost point	N.	20°	W.	5¼ miles.
The middle point is seven and one-quarter miles distant from the Light-house and the Northwestern point is nine and one-quarter miles distant.				
Cape Lookout	N.	17°	W.	39⅜ miles.
And this course passes one mile outside of Cascade Head at twenty-two and one-half miles; and one and a half miles outside the Haystack Rock at thirty-two and one-third miles; and five-eighths of a mile outside of Cape Meares at forty-eight and five-sixths of a mile.				
Tillamook Rock Light-house	N.	20°	W.	75½ miles.
Point Adams Light-house	N.	19°	W.	91 miles.
Cape Disappointment Light-house	N.	21°	W.	96 miles.
Cape Shoalwater Light-house	N.	22°	W.	122 miles.
Gray's Harbor Outside Buoy	N.	24°	W.	133 miles.
Destruction Island (proposed Light-house)	N.	27°	W.	192 miles.
Tatoosh Island Light, Cape Flattery	N.	29°	W.	223 miles.

On the 1st of October, 1874, the fifth order light, which had been chosen from the North Point of the Yaquina entrance, was discontinued.

Tebenkoff has no river nor point in the position of the Yaquina River and Yaquina Point, but he has a stream entering a small cove on the leeward side of Cape Foulweather. On the contrary he has the Yakoune River placed under Cascade Head in latitude 45° 02′. The U. S. Coast Survey reconnaissance of 1850 had no stream where the Yaquina opens, but had the Alseya River placed in 44° 38′, only seven miles South of Cape Foulweather. That reconnaissance also placed the Yaquina River in 45° 07′. The Indian name given to us about 1851–'53 was Ya-ka-nah.

The name as given by Lewis and Clarke (1806) and derived from the Tillamooks is Youikones; on the Coast Survey chart of 1850, without contact with the natives, Yaquinna; by Davidson 1851–'53, Ya-coo'-nah; by Gibbs in 1858, Ya-ko'-na; by Everett in 1887, Tak-wi-na.

The survey of the entrance to the river, the approaches, and the examination of the river beyond Elk Mountain, were made by the U. S. Coast and Geodetic Survey in 1868.

YAQUINA NORTHWARD—THE DAVIDSON INSHORE EDDY CURRENT.

Along the coast from the Yaquina River to the Columbia River the redwood drift logs and trunks which came from the southward of Cape Sebastian are found by the Indians and settlers along this shore, and are cut up and used for picket fences.

Yaquina Heads to Cape Foulweather.—*Yaquina Head* is composed of a dark basaltic breccia or conglomerate, probably running into ores of iron which are highly magnetic and occasion great deflection of the magnetic needle on shore.

About a mile and a third north-northeast from the head, and half a mile in from the shore, there is an isolated butte or peak covered with trees; it rises six hundred and twenty-eight feet above the sea.

The shores from Yaquina Head to Cape Foulweather are cliffs generally of a whitish or yellow sandstone which is very friable. Under these are clay slates filled with fossil clams, pectines, etc.

The beach under the cliffs is composed of silex and basalt, and in numerous localities the black sand (magnetic oxide of iron) is found in considerable quantities. The beaches are flat, and when a large sea is rolling in there are four or five rollers beating upon the beach; in a heavy storm a stranded ship would not long withstand their destructive action.

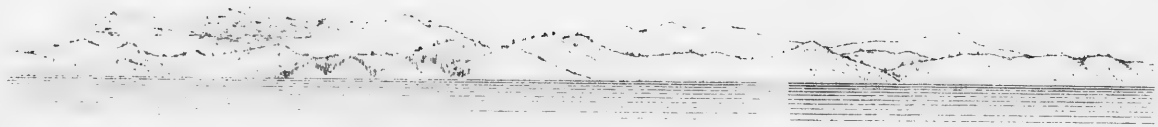
Dangers.—About a mile northward from Yaquina Heads and two-fifths of a mile off shore an isolated ledge of rocks appears at low water.

Otter Rock is about a mile south of the south end of Cape Foulweather and rather more than

Yaquinna Head.
Light-house, NE. by E. ½ E., 12¼ miles.

Sand dunes.

Yaquinna Entrance, E. by N., 13 miles.



Cape Foulweather, NE. ½ N., 15 miles.

Cascade Head, N.. 8 miles.

half a mile off shore. It is thirty-six feet high and appears flat-topped when seen from the westward; but when seen from the south-southwest the surface slopes to the westward. A low ledge of rocks lies about half a mile south-southeast from Otter Rock; and another ledge covered with kelp lies to the northward. Between Otter Rock and the rock off the south point of Cape Foulweather there is a patch of kelp over foul ground and one break.

CAPE FOULWEATHER.

This is a well-marked headland, commencing at four and a half miles north by west (N. by W.) from the Cape and ending at ten and a half miles, the extreme western point of which is five and five-eighths miles north twenty-degrees west (N. 20° W.) from the Light-house on Yaquina Point.

The coast southward to Heceta Head is very nearly a straight line with the greatest eastern recession barely one mile at Yaquina Entrance. The line to Heceta Head is south seventeen degrees east (S. 17° E.) and the distance thirty-eight miles; at twenty-nine miles the line is tangent to Cape Perpetua.

The stretch of four and a half miles of nearly straight shore-line from Yaquina Point to Cape Foulweather is bordered with low, yellow, broken cliffs covered with standing burnt trees which cover the ridges that rise to more than six hundred feet within half a mile or a mile from the shore. There is a good broad low-water beach along this shore. Two and seven-eighths miles north by west (N. by W.) from Yaquina Point there is a low, flat, black rock one hundred and fifty yards long north and south (N. and S.) that lies about half a mile off the shore; and at three and one-third miles north by west (N. by W.) from the Point there is a black rock about two hundred yards in extent and thirty-six feet high. It lies seven-eighths of a mile south from the Cape and is a little over half a mile off shore. It is called *Otter Rock*.

The seaward face of Cape Foulweather is six miles in length and is marked by six or seven grassy headlands, which slope beautifully to the rocky sea-cliffs; the southwestern slopes of the heads are generally bare grass, but the summits are partly burned. The gulches are densely wooded. Although the face of the Cape is broken and rounding, it has a general direction north by west, and south by east. The extreme western part of this face is about nearly straight for two miles, north-northwest and south-southeast, and is divided into three spurs nearly in line in that direction and of almost equal breadth and separated by small streams which have cut deeply through the rocks. About seven-eighths of a mile southwestward of the westernmost point of the cape there is a high, rocky point, reaching four hundred and thirty-three feet elevation within one hundred yards from the sea.

Five-eighths of a mile off this high rocky point, and nearly in line with the three western spurs of the cape, there is a rocky islet nearly four hundred yards long north and south, thirty feet high, and one-third of a mile off shore. It is a mile north-northwest from Otter Rock, with a ledge extending two hundred and fifty yards to the northeast. Beyond this is a break about four hundred yards farther to the north-northwest. There are dangers inside of this islet. The reconnaissance chart gives eighteen fathoms one mile outside these rocks.

Five-eighths of a mile inside and nearly east of the bold point, one mile southeast from the western point, the ridge rises to one thousand one hundred and thirty-nine feet elevation, and at one and five-eighths miles on the same course the top of the ridge is sixteen hundred feet above the sea.

The northern of the three western spurs of the Cape is marked by a low, grass-covered table or plateau projecting sixty feet above the sea to the northward. Southward of this table, and behind two black, rocky islets almost touching the point of cliff of the same height, which stretch southward nearly one-sixth of a mile, there appears from seaward to be an opening to a small cove with yellow cliff and broad sand beach on the further side, upon which no surf was seen. It seemed probable that a boat landing could be safely effected there in ordinary west winds. The cove is clearly shown upon the reconnaissance chart of 1887. The north and east sides receive three small streams.

The black point indicating this cove is marked by a small, dense clump of trees. We first saw this cove in the reconnaissance of 1869. One mile to the north-northeast of this northern spur, in a recess of the shore, there is a small lagoon opening to the sea by a narrow mouth, and receiving the waters of two small streams.

Directly off this recession of the shore, and on the line of the points north and south, is a sunken rock.

The rocky character of the cape continues three miles to the northward from the middle point of the northern of the three western spurs. The cliffs are from fifty to eighty feet high, but one mile from the northern extreme the point rises to two hundred and thirty-eight feet elevation only one hundred and seventy-five yards inside the cliffs.

The mountain mass of this cape is about two and one-half miles eastward of the seaward face, and averages about fifteen hundred feet elevation. Were it not for the lower shores to the northward and to the southward, the outline of the cape would hardly break the general trend of the coast.

There are no known dangers as far out as half a mile beyond the westernmost face of the cape, and every indication of deep water.

When a vessel is off Cape Foulweather the high mountains of the Coast range, ten to twenty miles inland, are seen over the coast hills; and to the east-southeast and southeast are seen the notable mountains, Mary's Peak, Alseya Peak, and Yachats Mountain.

The geographical position of the extreme western point, Cape Foulweather, has been determined by the U. S. Coast and Geodetic Survey (1887) as follows:

Latitude	44° 46′ 14″ north.
Longitude	124° 04′ 34″ west.
Or, in time	8h 16m 18s.3

One-fifth of a mile behind this bold face the height of the ridge is four hundred and eighty eight feet.

Magnetic Variation.—In January, 1885, the line of equal magnetic declination of 21° East crossed the coast-line in the latitude of Cape Foulweather and moves northward about 1′.0 annually.

The following bearings and distances are given to prominent objects from Cape Foulweather:

Cape Orford Light-house	S. 12° E.	120 miles.
Cape Gregory Light-house	S. 13½ E.	88 miles.
Umpquah River entrance	S. 18° E.	66½ miles.
Cape Perpetua	S. 18° E.	29½ miles.
Yaquina Heads Light-house	S. 20° E.	6⅞ miles.
Cascade Head	N. 13° W.	16⅞ miles.
The Haystack Rock	N. 13° W.	26⅝ miles.
Cape Lookout	N. 16½ W.	34½ miles.
Tillamook Rock Light-house	N. 20° W.	68 miles.
Point Adams Light-house	N. 19½ W.	84 miles.
Cape Disappointment Light-house	N. 21° W.	88½ miles.

Landmark.—The extreme summit of Cape Foulweather is near the southern part of this broad headland; it appears one and three-quarters miles back from the ocean face, and is about sixteen hundred feet above the sea; to the eastward of this high land the ground falls away to six or seven hundred feet elevation. There is a treeless and grassy patch on the southwest slope of this summit, and it is a good landmark. From the middle point of Cape Foulweather there is a peak seven and three-quarters miles north forty-three and a half degrees east (N. 43½° E.). It lies five and three quarters miles back from the shore-line.

The cape is composed of very dark basaltic rock, capped in many places with bright red and yellow sandstones.

The north end of the sandstone cliff at the southern end of Cape Foulweather is sixty feet high, colored red and yellow, and covered with trees to the edge. One great perpendicular wall of basalt, four hundred and thirty feet high, shows in the face of the Cape one mile to the northwest from the southern point. It then slopes gradually to the northeastward for a quarter of a mile to the edge of the forest at five hundred and thirty-four feet elevation.

The indentations in the face of the Cape are where the sandstone above the basaltic breccia has been eroded by the waves.

One peculiarity of the middle of the Cape is a plateau about seventy feet high, nearly half a mile long, and a quarter of a mile wide, wholly free from trees.

The forest is spruce and hemlock; the spruce range from one to two hundred feet in height, with boles of six and eight feet in diameter.

DEEP-SEA SOUNDINGS OFF CAPE FOULWEATHER.

The following deep-sea soundings were made by the U. S. ship *Tuscarora* on the 20th and 22d October, 1873:

Distance and bearing from Cape Foulweather.		Latitude.	Longitude.	Depth.	Temperature of water at bottom.	Character of bottom.
Miles.	*Degrees.*	° ′	° ′	*Fathoms.*	° *Fahr.*	
17½	S. 64½ W.	44 40	124 28	97	.....	Mud and gray sand.
22½	S. 70 W.	44 50	124 33	134	.....	Gray sand.
26½	S. 71½ W.	44 51	124 40	206	.....	Gray sand and black specks.
33	S. 73 W.	44 52	124 47	237	41.0	Do.
36½	S. 74½ W.	44 52	124 55	294	41.0	Clay.
41½	S. 74 W.	44 53	125 01	525	.....	Hard clay; fine black specks.
43	S. 75 W.	44 54	125 05	733	.....	Blue mud; fine black sand.
49	S. 74½ W.	44 54	125 13	834	36.0	Fine gray sand; black specks.
59	S. 76½ W.	44 57	125 29	1,532	34.8	Clay, with specks of coarse black sand.
76	S. 85½ W.	45 10	125 48	1,578	.....	Clay.
108	S. 81½ W.	45 10	126 35	1,498	.....	Ooze.
152	S. 82 W.	45 19	127 38	1,576	.....	Brown ooze.
207	S. 79½ W.	45 18	128 57	1,539	.....	Ooze.

Off Cape Orford the one-thousand fathom line is not more than twenty-eight miles from the coast; but off Cape Foulweather the same depth is not less than fifty-one miles from the shore. The Pacific plateau, as far out as the 128° meridian, is very regular, but one hundred fathoms shoaler than off Cape Orford.

Cape Foulweather was named by Cook on the day he made this landfall of the coast, March 6, 1778. At noon he was in latitude 44° 33′, and the land extended from northeast half north to southeast by south, about eight leagues distant. In this situation he had seventy-three fathoms over muddy bottom, and ninety fathoms a league farther off shore. The land he describes of moderate height, diversified by hills and valleys, and principally covered with wood. No striking object presented itself except a high hill with a flat summit, which bore east [true] from him at noon. (See page 386.) At the northern extreme, from his noon position, the land formed a point which he named Cape Foulweather, from the exceedingly bad weather he met with soon after. The expression "northern extreme" led the United States Exploring Expedition in 1841 to place the Cape in latitude 45½°, but Cook judged the Foulweather he named to be in 44° 55′. Being here driven off the coast by continued bad weather, he had no opportunity to verify his position, and did not sight the land again until he was in latitude 47° 05′, thus passing by the entrance to the Columbia River. Vancouver places the Cape in latitude 44° 49′. Both of these determinations evidently refer to the northern part of the high land, nine and a half miles north of Yaquina Heads.

If we plot Cook's bearings we find that in latitude 44° 33′, longitude 124° 23′, they cut the northern part of the highland of Cape Foulweather in latitude 44° 50′, twenty-one miles distant; and the southern part of Cape Perpetua in latitude 44° 16′, twenty-two miles distant; while the low shore directly east is distant fourteen miles and backed by high hills. Three miles to the west northwest of his position, where he found seventy-three fathoms of water, the United States Coast Survey has a sounding of ninety fathoms. Tebenkoff gives seventy-three fathoms over sandy bottom eight miles from the coast in latitude 44° 32′. He makes the Cape very projecting and, curiously, has a bay on the south side which receives one arm of the Khonga River, while the other opens north of the Cape. The reconnaissance of 1887 has no such streams, and on the latest State map there is no stream on either side of the Cape. Tebenkoff places the extremity of the Cape in 44° 48′.

Vancouver says that Cape Foulweather is

> a conspicuous promontory, almost as singular in its appearance as any we have seen along the coast. A high, round, bluff point projects abruptly into the sea; a remarkable table is situated to the north, and a lower round bluff to the south of it. (Vol. I, p. 208.)

North of Cape Foulweather.—For five miles northward towards the Siletz entrance the shore is a sand beach of soft and coarse sands much worn by the sea. The low bluffs of soft and yellowish sandstones are much eroded, and nowhere over eighty feet above the sea. The cliffs terminate

abreast the south end of Siletz Bay; and thence to the entrance there is a narrow peninsula of sand dunes generally covered with short sallal bushes.

The immediate beaches are flat and in a heavy sea exhibit four or five lines of rollers. In great storms a stranded vessel would soon go to pieces.

Dangers.—From the northernmost point of Cape Foulweather there is a line of five breakers extending two miles on a course one or two degrees west of north, and lying six hundred yards from the beach.

SILETZ RIVER.

The mouth of this river lies exactly six miles north four degrees west (N. 4° W.) from the northern point of Cape Foulweather, and seven and three-eighths miles south eighteen degrees east (S. 18° E.) from the southern point of Cascade Head.

The last mile of the Cape Foulweather Cliffs is bordered by many small visible rocks close under the shore, and one breaker half a mile north by west (N. by W.) from the north point.

After leaving Cape Foulweather the shore continues abrupt with light-colored cliffs from twenty to one hundred feet high, and a broad low-water beach. Behind these cliffs are barren sandy slopes, sparsely covered with pine and spruce; and two miles inland are the summits of the high wooded hills rising to nine hundred feet, the high mountains of the Coast range, fifteen to twenty miles eastward, showing over the Coast-line. Three or four low, grassy slopes are seen to the northward of the Cape, and abreast of these are two sunken rocks a third of a mile apart, and nearly one-third of a mile off shore. The northern one is two miles north of the Cape.

About two miles south of the mouth of the Siletz there is a rounding, yellow bluff for half a mile, which rises to one hundred feet.

A long, narrow peninsula, nearly two miles in length, forms the southern and western boundary of the bay; it is formed by a line of low sand dunes, with a broad, low-water beach. The north point of the entrance is a low bluff, bordered by a narrow line of sand. The entrance to the bay is three hundred and fifty yards wide at high water, but not over one hundred yards wide at low water, and the bar breaks constantly. From the north point the bar lies to the southwest about one-fourth of a mile (1887) and the apparent direction of the channel across the bar was nearly northeast.

Inside the entrance the bay expands very like the south part of Humboldt Bay, but is much smaller. The southern boundary of the bay is two and one-eighth miles from the entrance and is mostly bare at low water, and the eastern side is very marshy. To the north there is no expansion, and a small stream called Schooner Creek enters at half a mile from the entrance to the bay. The Siletz or Nachicolcho River enters the southeast point of the bay, coming through a high, heavily wooded country by a tortuous course. Where it leaves the hills there is one summit of six hundred and fifty feet within one-fourth of a mile of the north or right bank, and a summit of nine hundred feet one mile to the south. The country is heavily wooded and so broken up that there are no Indian trails.

There are four houses on the north side of the bay about a quarter of a mile inside the entrance.

The geographical position of the north point inside the entrance to the Siletz River is:

Latitude	44° 55′ 39″ north.
Longitude	124 01′ 24″ west.

In 1865 the brig *Blanco* was driven across the bar, and lay a week inside.

The reconnaissance chart (1853) gives sixteen fathoms of water one mile off the mouth of the river.

In 1887 it was judged that the depth of water on the bar was six feet, when it broke all the way across.

The United States Exploring Expedition in 1841 locates a stream in this vicinity called the Zasitsh. Tebenkoff has no stream here. On the early editions of the Coast Survey Chart the name of this stream was Nekas. But the Siletz U. S. Indian Reservation located here takes its name from the Indians, and the reconnaissance of 1887 gives Siletz and Nachicolcho. There have been many different spellings of the former name. Previous charts have a small stream emptying near this called the Cowes River; and De Mofras calls it the Yacoun.

Landmarks.—From the north part of the Siletz entrance there are two prominent hills situated as follows: The southern one is distant three and one-eighth miles north seventy-seven degrees

east (N. 77° E.), and the northern one is distant three and one-quarter miles north forty-eight degrees east (N. 48° E.).

From the Siletz northward a hard, wide beach extends six miles to the precipitous rocks just south of Salmon River. The sandstone strata are horizonal. Through their strata are ancient tide lands, or bogs, containing great numbers of prostrate trunks of spruce, etc., highly compressed but very little fossilized, and which burn readily.

DEVIL'S LAKE.

From the north point of the entrance to the Siletz the shore runs straight for seven miles north by west (N. by W.) to entrance of the Nechesne under Cascade Head. The shore is a low, yellow or reddish cliff for two-thirds of a mile to a small jagged point, and then increasing in height to eighty and one hundred feet to the mouth of the Nā-āh-so or Devil's Lake at two and one-half miles from the North Point of the Siletz. Behind the cliffs the higher land is partly bare, burnt and wooded. This is a very narrow entrance breaking down the cliffs. The lake itself is two and one-half miles long by half a mile wide, and comes from the north, nearly reaching to one of the marshy arms of the Nechesne. This lake is sometimes called Trout Lake. Three or four miles inland are round-topped mountains covered with the white burnt trunks of trees, and a dense second growth.

The surface of the lake is ten feet above the sea. Very large trout can be caught by trolling. The lake is a great resort for spawning salmon. The Indians living around it have houses, and are employed in farming and stock-raising.

Inland from the lake the land rises in a succession of broken hills and ridges to the crest-line of the Coast range of mountains.

Danger.—A little more than half a mile south fifty-seven degrees west (S. 57° W.) from the entrance of the Devil's Lake there is a break. It is five miles south fifteen degrees east (S. 15° E.) from the southern point of Cascade Head.

THE NECHESNE OR SALMON RIVER.

Six miles from the North Point of the Siletz, and twelve miles from the North Point of Foulweather, there is a rocky line of rugged cliffs facing five-eighths of a mile on the ocean; the summit is grass-covered and rises to four hundred and seventy-eight feet, dropping off sharply to the low, sandy point on the north side; it continues southward with reddish-faced cliffs, twenty to sixty feet high, towards the entrance of Devil's Lake, as a broad mesa land, reaching an elevation of five hundred and ten feet, and then gradually decreasing in height; and at three miles from the rocks this ridge has a few scattering trees upon it. One mile behind this beautifully green and rolling mesa are the arms of Devil's Lake and the Nechesne, which nearly approach each other, and thus make it stand out in bold relief. Under the rocky cliffs at the south side of the river are many rocks; and one large one, two hundred yards in extent and seventy-four feet high, stands one-third of a mile west-southwest (WSW.) from the south point of the rocky face. Between this rocky face and the south side of Cascade Head the shore is low and sandy and recedes slightly to the east, with a low-water beach four hundred yards wide. Immediately under the south side of Cascade Head there are three large, black rocks, seventy, twenty, and fifty feet high, which stretch out one-third of a mile towards the south-southeast (SSE.), and apparently afford protection for a boat landing in ordinary northwest weather. They are three hundred yards outside the low-water beach at the mouth of the river, which opens close under the high rocky cliffs on the south side of Cascade Head. The south point of the entrance is the long, broad, sand spit which makes north two-thirds of a mile from the rocky cliffs of the mesa just mentioned. The stream itself is about three hundred and fifty yards wide for one mile inside the mouth, and then expands into broad marshes one and a half miles long East-southeast (ESE.) by two-thirds of a mile broad. At low water the stream is not over sixty yards wide.

On Tebenkoff's Chart this cove is shown under Cascade Head, and the stream is called the R. Yakoune.

On the reconnaissance chart of 1850 it was called the Yaquinna River.

On the U. S. Coast Survey reconnaissance chart of 1853 and the chart of 1870 it is named the Nechesne, with rocks at the entrance.

On the sectional map of Oregon, 1886, it is called Salmon Creek.

Landmark, etc.—Just south of Salmon River (under Cascade Head) the ridge of precipitous rocks reaches five hundred and ten feet elevation. The exposed precipices are basaltic breccia near the water, overlaid by a capping of very friable reddish rock continually wearing away. The face of this line of cliffs is a good landmark.

The isolated rock lying off this precipitous point is about one hundred yards in extent and seventy-four feet high; it lies about one-third of a mile from the shore.

The run of salmon in Salmon River is reported to be very great, whence its name.

CASCADE HEAD.

For two and a half miles northward of the North Point of the Siletz River the shore is a line of broken yellowish cliffs, moderately low, and backed by a higher ridge partly bare, burned and wooded. There is a break in these cliffs at the mouth of the Devil's Lake. Then begins a line of reddish cliffs, sixty to thirty feet high, running northward for three miles, rising to a beautiful mesa land, and ending in the grassy head on the south side of the Nechesne River, or Salmon Creek. The ridge above these cliffs is without trees, and as seen from the sea is beautifully green and rolling. Behind it are the arms of the Devil's Lake and the Nechesne River, which nearly approach each other.

The ocean face of Cascade Head is three miles long on a north by west (N. by W.) course from the mouth of the Nechesne to the beach on the north side of the head. The southern point is very slightly the farthest west and is twenty-two and one half miles from Yaquina Point Light-house, but they are not intervisible. The course from the Yaquina Light-house to Cape Lookout is north seventeen degrees west (N. 17° W.) and this line passes one mile outside of Cascade Head.

Cascade Head lies sixteen and three-quarters miles north thirteen degrees west (N. 13° W.) from Cape Foulweather. This is a very jagged headland and lies nearly two-thirds of a mile outside the line of the sandy shore at the south side of the Nechesne River. It shows prominently when a vessel is close inshore, more especially on account of the low coast line to the south and to the north.

This head is composed of very dark basaltic rock, capped in many places with bright red and yellow sandstones rapidly wearing away.

The ocean face of the head is cut by deep gorges through the sandstones, through which run three considerable creeks which discharge their waters directly into the surf from cascades sixty to eighty feet high.

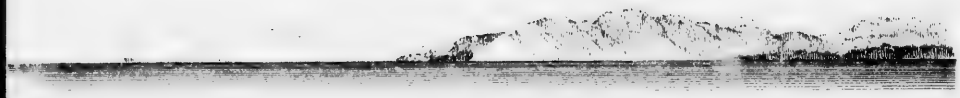
The cliffs behind the sand beaches are sandstones, clay slates, and beds of indurated sand, all appearing of very light color.

The great transverse ridge ending at the broken face of this Cape is nine hundred and fifty feet above the sea, rises to an elevation of thirteen hundred feet in a quarter of a mile, and reaches fifteen hundred and fifty-five feet in one and a quarter miles northeast from the south point of the head. The whole cape is densely wooded with spruce, hemlock, and alder. The southern slope of the high ridge is very steep, almost bare of trees and covered with fine grass, clover, and fern. To the northward from the backbone of this ridge the country is one unbroken, dense forest of spruce, cedar, and hemlock. The larch is a very handsome tree on the higher ridges.

The extreme southwest point or knob of the cape overlooking the sea is five hundred and thirty feet high at two hundred yards back from the water. The broken face just north of the Double Arch Rock is seven hundred and seventy-three feet above the sea, with one of the cascades at its northwest termination.

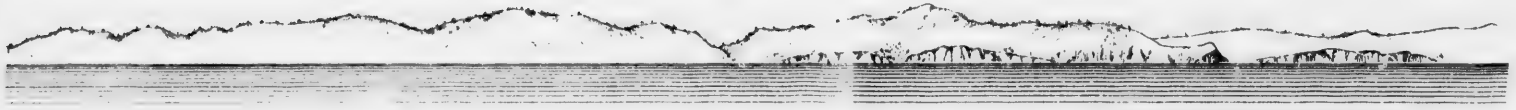
As seen from the southward from a distance of ten miles it is particularly noticeable by having two or three great fir trees standing alone and high above the outline of the second higher seaward slope at an elevation of perhaps seven hundred feet. Under these trees and also a little farther eastward, under the south slope of the crest-line of ridge running northeast by east (NE. by E.), there are four high, bare cliffs and a higher grassy slope farther in shore. When we made our sketch the highest part of the head was in the clouds; but two miles from the sea it reaches about two thousand feet elevation.

As seen from the westward the head does not appear so steep but the southern crest-line rises to one thousand three hundred and fifty-five feet within seven-eighths of a mile, when the northern of the four rocky cliffs appears under the highest part of the ridge, two thousand feet. Except where the rocky seaward face of the head is exposed the rest is covered with trees; but two grassy slopes face the sea some distance northward of the cliffs. There are no trees on the single gentle slope near the bold shore of the northern extremity, at the base of which a large cavern is seen.



Cascade Head, N. by E., 25 miles.

Cascade Head. E. ¼ N., 12 miles. Grassy Head, 510 feet.



Cascade Head, SE. by E. ½ E., 18 miles.

Long line of white sand dunes inside. Cape Kiwanda. Haystack Rock, E. ½ S., 14 miles. Entrance Nestuggah River.

When the Head bears east by north, and about ten or twelve miles distant, the yellow or reddish cliffs under the green mesa on the south side of the Nechesne River show clearly, and at the northern end of that mesa there are the dark, rocky cliffs under the grassy hillock which have sometimes been mistaken for a high rock close inshore.

As seen from the northwest, at a distance of about eighteen miles, the point of the cape seems low, with only one of the four cliffs showing, and beyond it the same grassy head and bright cliffs south of the Nechesne entrance. Cape Foulweather is seen just on the horizon. At a distance of twenty-six miles the Cape is almost sunk to the horizon under distant mountains, and the higher land to the northeast of the cape shows well above it.

The southern and westernmost limit of the cape is a bold, rocky cliff rising to five hundred and thirty feet in two hundred and forty yards from the sea, and running to the east-northeast (ENE.) is a high ridge covered with forests and the south slopes green. There are no outlying dangers at this part of the head, but three large, black rocks, already mentioned, stretch out one-third of a mile from the south face. The two larger are about eighty yards each in extent and seventy and fifty feet high. Between them is the smaller one, only twenty feet high. They are directly in front of the Nechesne River, and it is possible there may be a boat landing behind them.

There are no known hidden dangers outside of the visible rocks close under the shore of Cascade Head.

This southern point is only one-third of a mile broad, and on the North side there is nearly a half mile of very broken face more than five hundred feet high, and showing quite red when the sun is shining upon it.

A line of four rocks one-eighth of a mile from the cliffs commences just north of the red cliff of Cascade Head; these rocks are forty to fifty feet high. Seven-eighths of a mile northward from the southern point of the cape there is a rock about forty five feet high with two arches in it; this is the third rock of the line. At one mile there is a sharp point of cliff with the fourth rock forty feet high close under it.

The surface of the Double Arch Rock, forty or fifty feet high, slopes to the westward; the two arches are seen from the northward.

Inside and east of this middle point of the cape there is a broad, broken cliff as high as seven hundred and seventy-three feet at the easternmost part and ninety-two feet at the northern part.

At this ninety-two feet point there is a small stream breaking through a sharp valley directly upon the sea, and a cascade falls upon the rocky shore. Five hundred yards north of it in a deep, narrow cove there is another stream leaping into the sea, but it is soon shut in by the jutting point on the north side. The ridge between the two cascades is eight hundred and forty-six feet high, and the ridge to the north two hundred and fifty-eight feet. These peculiarities prompted us to name this headland Cascade Head in 1867. When approached from the north, with the southern extremity of the cape bearing south by east (S. by E.), two rocks appear just tangent to the south point, but are really nearly a mile north by west (N. by W.) from it. The outer one is comparatively low and broad, and has two arches through it; the inner arch is the larger, and through it is seen the beach beyond. This rock has already been described.

There are no known hidden dangers so much as a quarter of a mile from the faces of the rocky cliffs. We have passed within a mile of it, and the reconnaissance chart of 1853 gives a depth of twenty-one fathoms of water about one mile broad off the head.

The geographical position of the southern and westernmost point of Cascade Head has been determined by the U. S. Coast and Geodetic Survey (1887) as follows:

Latitude	45°	02′	49″ north.
Longitude	124	01′	09″ west.
Or, in time	8h	16m	04.6s

In January, 1885, the magnetic variation was 21° 07′ east, with a yearly increase of 1′.8.

From Cascade Head we have the following bearings and distances to important objects:

Cape Orford Light-house	S.	10°	E.	135 miles.
Cape Gregory Light-house	S.	13°	E.	103 miles.
Yaquina Heads Light-house	S.	18½°	E.	22½ miles.
Cape Foulweather (westernmost point)	S.	13°	E.	16⅝ miles.
Cape Lookout	N.	20°	W.	17½ miles.
Tillamook Rock Light-house	N.	20°	W.	53 miles.
Cape Disappointment Light-house	N.	21°	W.	74 miles.

From the north point of Cascade Head the shore retreats to the north-northeast (NNE.) for one and one-quarter miles with a bold, rocky shore rising to five hundred feet in one-third of a mile. The steep-sided, forested valley of the Nescowen or Slab Creek opens upon the sandy beach, where the timbers of a wreck were distinctly visible as we passed within a mile of it in July, 1867. The valley comes from the southeastward between high, wooded hills, and directly off the mouth, at the edge of the low-water beach, is a rocky islet about two hundred and fifty yards in extent and estimated to be one hundred and twenty feet high.

Slab Creek.—This is a considerable stream just north of Cascade Head. The rock off the mouth is one hundred and twenty feet high, and the top is covered with grass and a few low trees; but it is too close to the shore to show prominently as a landmark.

There is good land along the valley of Slab Creek and eight or ten settlers have located upon it.

Abreast the coast between Cascade Head and the Nestuggah River the Coast Range mountains, although not high, approach the shore within ten or twelve miles; but farther northward they recede again.

THE NESTUGGAH BAY AND RIVER.

North of Cascade Head there is a sand beach stretching over seven miles to the north by west (N. by W.) until it reaches the lower cliff of the Cape Kiwanda abreast the Haystack Rock. Immediately behind the first mile or two is a narrow line of marshes, and thence to the mouth of the Nestuggah the beach is narrowed and the undulating hillocks beautifully green with fern to their summits, which rise to five hundred and thirty feet elevation, marked here and there with groves of alder and spruce. Behind these green hills the mountain forests are burned to the line of the Coast range.

The entrance to the Nestuggah is five and one-third miles almost due north from the Northern Point of Cascade Head.

The landmark for the approach to this stream is Haystack Rock, described on page 429, but the closer mark for the entrance is three or four green hillocks rising from three hundred to five hundred and thirty feet high and crowding to the shore to form the southern and left bank of the river. The beach at the seaward face of the sloping hills is low and sandy, with one small lagoon inside the beach a mile south of the entrance. Stretching from Cape Kiwanda at the north towards the south head of the entrance to the bay is a low, narrow sand spit, three miles long. It ends in a very narrow point which, at the examination of 1883, approached the base of the hillock on the south side of the entrance within less than one-eighth of a mile. From the summit of the south head a broad, nearly level ridge runs northward nearly two miles inside, and nearly parallel with the north sand spit, and ends in a broad tree-covered point behind which lies the Little Nestuggah Bay.

In 1883 there was reported to be a depth of six feet of water upon the bar at the entrance to the Nestuggah, with a constant breaker, but a small schooner, called the *Kate and Anna*, had crossed it several times with that draught.

In the summer of 1887 there was estimated to be five feet of water on the bar at the entrance, which is poor. The small steamer always touches the bar when entering or leaving.

In July, 1889, the depth of water on the bar of the Nestuggah is reported three feet at low tide, and not over nine feet on the large tides.

Inside the entrance the bay or lagoon is shaped like a U, with the bottom of the letter turned to the north, and the dividing peninsula is the high ridge which ends in a tree-covered point already described. The western arm of the bay is known as the Nestuggah, and the eastern arm as the Little Nestuggah. They are about equal in area, each about one and three-quarters miles long by half a mile broad, but the Little Nestuggah is surrounded by extensive marsh lands. Both are filled with sand and mud flats, bare at low water. Into the southeastern part of the Little Nestuggah empties the river of the same name; and into the northwest part of the Nestuggah Bay, opposite the northern end of the dividing ridge, empties the Nestuggah River, up which the tide is reported to flow about six miles. Between the whole length of the Nestuggah Bay and the first two miles of the Nestuggah River on the east and the ocean shore on the west lies the sandy peninsula which begins abreast the Haystack Rock and runs southeastward three and a third miles to the entrance of the bay.

This low peninsula is nearly three-quarters of a mile broad about midway or abreast the

mouth of the Nestuggah River, and at this broad part the sand dunes rise higher than elsewhere. At one mile northwestward of the entrance to the river into the bay the former bends to the westward and approaches the ocean shore within less than one-fifth of a mile at a point one mile from Cape Kiwanda. It is not unlikely that the river formerly broke through here.

The hills around the bay are very generally devoid of trees, and are covered with grass and fern. They reach five hundred feet elevation and are underlaid by hard basalt which crops out near the shore at various places.

The sand from the ocean shore is drifted by the summer winds over the peninsula and has a constant tendency to overwhelm the bay. These dunes are from fifty to sixty feet high.

One mile back from the ocean, on the north side of the Big Nestuggah, is the village of *Woods*, with a small saw-mill, and a population of two hundred people. Salmon in great numbers enter the river to spawn; hence a large cannery was built here in 1887, on the outer bay half a mile from the entrance. A small saw-mill has been built a little higher up.

The geographical position of the mouth of the river was determined by the U. S. Coast and Geodetic Survey, with close approximation, in 1887.

The summit of the western grassy hillock is given; it lies about half a mile southeast by east three-quarters east (SE. by E. ¾ E.) from the bar.

Latitude	45° 09′ 10″ north.
Longitude	123° 57′ 42″ west.

This hillock is eleven and one-third miles south thirty-two degrees east (S. 32° E.) from Cape Lookout, the line passing just inside the extremity of Cape Kiwanda.

On the 2d of December, 1886, during a hard storm of thick weather, the British bark *Carmarthen Castle* went ashore on the south side of the Nestuggah entrance.

The course of the Nestuggah River is quite short; it rises in the east-northeast (ENE.) in the farthest recession of the western flanks of the Coast Range mountains, which north of this river leave the coast from fifteen to twenty miles.

The reconnaissance of 1850 has no stream in this vicinity. In the reconnaissance of 1853 the the same was misapplied, and the mistake has been continued. On the sectional map of Oregon, 1886, it is shown to be the Nestuggah, with a small settlement named Oretown on the Little Nestuggah, and a town named Hebo ten miles up the Nestuggah. The latter drains a large extent of moderately low, rolling country. In 1883 the name of the bay was spelled Nestucca.*

De Mofras represents the Haystack Rock on his chart, and under it is the B^{e} del Engaño.

HAYSTACK ROCK.

The principal feature and landmark in the approach to the coast near the Nestuggah River is the Haystack Rock, which lies half a mile off the shore-line three and one-fifth miles northwest by north (NW. by N.) from the entrance; or three and three-quarters miles north thirty-eight degrees west (N. 38° W.) from the western green hillock behind the south point of the entrance. The position of this rocky islet marks the north end of the long sand spit, north of the entrance, which increases in height to sand hills abreast the Haystack. We passed within a mile and a half of this islet in 1867, and when abreast of it there appears a large slit on its steeply sloping northern side extending half its height, as if a large, irregular slab of rock were lying against the islet and only touched at the top and bottom. The height of the rock is three hundred and twenty-seven feet; its outline is nearly like a haystack, and its color is dark more than half-way up, especially on the north side, and white (July) on top from the accummulation of guano. This prominent rock shows out well because the land behind it is comparatively low for some distance; and the low, yellow cliffs to the north are only half its height. It is nearly half a mile from the nearest part of Cape Kiwanda, and it appeared to us that there might be a passage inside of it.

When a vessel is close inshore in the vicinity of Cape Lookout, Haystack Rock is seen standing well out from the low sand spit half a mile inside of it.

From the westernmost point of Cape Foulweather this notable landmark bears north thirteen degrees west (N. 13° W.), distant twenty-six and three-quarters miles. It lies just nine miles north thirteen degrees west (N. 13° W.) from the middle point of Cascade Head near the Double Arch

*The Coast Survey reconnaissance sheet 1853 gives the name Nestuggah, although no communication was had with the natives; Gibbs, in May, 1858, Nes-tug-ga. French chart 1979, 1862–'69 using Coast Survey authority, Nestuggah; Oregon State, county, and sectional map, 1874, Nestugga; Rockwell, 1887, Nestucca; the settlers, Nestuck.

Rock; and seven and five-eighths miles south twenty eight degrees east (S. 28° E.) from the extremity of Cape Lookout. The nearest point of Cape Kiwanda is eight hundred and fifty yards north twenty degrees east (N. 20° E.).

The geographical position of the highest point of the Haystack Rock was closely determined by the U. S. Coast and Geodetic Survey in 1887, as follows:

Latitude	45° 12′ 42″ north.
Longitude	123° 59′ 15″ west.

On the afternoon of April 26, 1792, Vancouver laid down this islet on his chart in latitude 45° 11½′ close under the shore. (Vol. I, page 209.)

Tebenkoff places it in the same position, evidently from Vancouver, but he has no stream south of it. He has a stream called the Kautie River four miles to the north of it.

The Indian name of this rock is Ta-dal-sal'-lo.

The Haystack Rock.—Anchorage.—It is reported that over the shoal ground south of the Haystack Rock there is very fair anchorage for small vessels in six fathoms of water. Over this flat bottom halibut have been caught. (July, 1889.)

The Doig Ledge.—The discoverer of this ledge says that the hidden danger lies two and a half miles south-southwest (SSW.) from the Haystack Rock, where he found five fathoms of water, and where less water may probably be found. He found the ledge by the surge of the sea over it in ordinary weather. It does not break in the ordinary northwest swell, but breaks heavily with a large southwest swell.

The ledge is evidently not a pinnacle rock because two large breaks have been noticed at the same time and both have areas of foam behind them.

The break upon this danger was seen by the discoverer from the bluff at the mouth of the Nestuggah in southwest weather. (July, 1889.)

CAPE KIWANDA, OR SAND CAPE.

Half a mile north-northeast (NNE.) of the Haystack Rock commences a low, cavern-worn, yellowish cliff of sandstone, with its top covered with grass and fern, and the inside slope covered with trees. The southern end of this line of cliff is at the north end of the low sand hills of the Nestuggah, and the ridge over it gradually rises to one hundred and eighty-four feet elevation and extends nearly a mile and a half northward where a very small stream of water is seen cutting through the beach at low water. Nearly a mile behind this yellow line of cliff and rising from the point there is a moderately long, white ridge of sand hills burned over. They rise to about five hundred feet elevation and appear as bright as sand dunes when seen from seaward.

The combination of the Haystack Rock, the yellow cliffs, and this white, sandy ridge behind the cape, together with bare hills a mile northward, is a peculiar feature and landmark. There is another white line behind Cape Lookout, but without the other two features.

The cape itself is a very small, narrow projection of less than half a mile from the general trend of the shore. Northward of it there is a broad low-water beach.

This comparatively low point or cape is composed of sandstone and is much eroded. On top of this are the loose drifting white sand dunes. The nearly bare sand hills adjacent were formerly covered with spruce and bull-pine, but these have been swept by fire and only the gray stumps remain. These sand hills reach an elevation, along the banks of the Big Nestuggah, of three to six hundred feet near the town of Woods.

Some of these sand dunes have enveloped spruce trees one hundred and fifty feet high.

These dunes are a notable feature from seaward.

From Cape Kiwanda to the entrance to Sand Lake a broad sand beach extends for three and a half miles; and for one and a half miles it is bordered by a half sandy and rocky line of cliff.

Behind this three and a half mile stretch there is a bare hill that rises to eight hundred and fifty feet at one mile inside the shore-line.

The geographical position of the Cape is given by its relation to the Haystack Rock already described.

In 1867 we designated this Cape as Haystack Point in order to give it a distinctive name. In the later reconnaissances of 1883 and 1887 it has been called Sand Cape or Cape Kiwanda.

This name is that of the Indian chief in that vicinity.

Nestuggah to Lookout.—The hills back of the coast-line from the Nestuggah entrance to Cape Lookout rise higher and higher as they reach to the eastward until the culminating summit of

The Haystack, 327 feet (from the westward).
Back country in haze, etc.

Cape Lookout, NE. by N. ¼ N., 17 miles. Sand dunes inside. Cape Kiwanda. Haystack Rock, 327 feet.

Cape Lookout, NE. by E. ¼ E., 11 miles.

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Mount Heevo is reached. The whole country has been burned over, except in the gulches and on the northern sides of ravines, and bristles with enormous standing trunks of whitened trees.

CAPE LOOKOUT.

Just two miles north of the Haystack Rock a very small stream of water cuts through the beach. It drains an insignificant pond; behind it are bare hills. The shore-line recedes slightly to the eastward for nearly two miles farther to the entrance of a lagoon nearly three miles long, north and south, and two-thirds of a mile broad, with a small stream coming into the northern part. The southern part lies close under the south point of the entrance for nearly a mile. This lagoon is locally known as Sand Lake, but the Indian name is *Nawuġġah*, or Nawóka.

It appears as a considerable body of water at high tide, but it is nearly drained at low tide. The entrance is three hundred and twenty yards wide at high water and is very narrow at low water. It is then fordable but has dangerous quicksands.

The south spit of the entrance is a short peninsula of low sand hills, generally set with low, scrubby sallal bushes and fern. There is marsh on the inside of the peninsula.

The north spit is a broad, flat, sandy waste, which reaches more than two miles to the northward.

There are two hills eastward of Sand Lake; the southern one is nearly two miles directly in from the entrance. They are located from the extremity of Cape Lookout as follows: The southern one is five and a half miles south sixty-six degrees east (S. 66° E.); and the northern one four and seven-eighths miles south eighty-seven degrees east (S. 87° E.).

Behind Sand Lake the land rises to steep rounded summits, partly burned over and covered with a second growth. The entrance is three and four-fifths miles north one-half west (N. ½ W.) from the Haystack Rock. Both points are low and sandy, and three hundred and forty yards apart. There is a small stream at low water and it is forded, but with dangerous quicksand. In 1887 the channel ran to the southward nearly half a mile south of the entrance.

An unbroken sand beach extends from Sand Lake to the walls of Cape Lookout; it grows narrower towards the northern limit, and changes from sand to gravel and shingle. One mile north of the entrance there commences a continuous wall of perpendicular sandstone cliffs, from fifty to one hundred and fifty feet high, crowding very near to the high-water line. Upon the top are beds of sand. These wastes of drifting sand extend from the north spit of Sand Lake in a direction nearly north, in a band about half a mile broad, to the base of the mountain behind Cape Lookout. This sand drift forms a prominent feature in the topography.

The reconnaissance sheet gives two or three soundings of thirty fathoms of water about one and a half miles from the shore between the entrance to Sand Lake and the Haystack.

Cape Lookout projects sharply and boldly into the sea, for one and a half miles. It is a remarkably narrow promontory of basaltic formation, ranging in height from one thousand feet at the inner limit, and four hundred and twenty-five feet high at the southwestern ocean extremity. In general terms it is a flat-topped cape, although it is cross-cut by several sharp depressions; the whole upper surface is covered with a dense growth of fir and hemlock.

The southern face of this basaltic dike is almost straight and lies in a west-southwest direction. Above the bare and bright rocky exposure of the cliffs of the southern face that reach four hundred to eight hundred feet elevation there is a rapidly rising line that is green with fern and sallal bushes reaching to the edge of the forest; these cliffs are marked by small caverns.

The southern face of the promontory is the higher, and the surface slopes gradually to the north side. The square ocean front face of the cape slopes off to the northward.

On the western face of the cliffs there is a very deep cavern, and the precipitous cliff is marked by two or three thin curving lines of darker stratification, dipping towards the northwest.

The wooded ridge of Cape Lookout is transverse to the coast-line and rising to the eastward culminates at an elevation of about twenty-five hundred feet, three and two-thirds miles northeast from the southwest angle of the Cape, and less than two miles from the ocean beach just north of the Cape. To the eastward of this summit the ridge falls away. This ridge and mountain appear (1887) to have never been touched by fire.

The basalts of Cape Lookout, unlike those of Yaquina Heads, Cape Foulweather, and Cascade Head are solid and homogeneous, and in some places prismatic and columnar. Near the base of the southern face are deep deposits of a bright yellow soil and clay, which have parted from the rocky face of the mountain in great slides. One enormous slide is evidently very recent (1887)

and is a conspicuous landmark from the southward. These great land-slides form a bowlder strewn beach half a mile wide, outside of which the water is apparently very deep.

The north side of Cape Lookout is cut by deep gorges and ravines, with great caverns. The forest on the top is spruce of great age and size, with enormous branches of fantastic shapes near the ground.

Great numbers of elk frequent the dense forests of Cape Lookout.

No rocks lie off this Cape, but a comparatively small one appears very close inshore, a little over one mile to the northeastward of the point; as seen from the northwestward this rock shows an arch through it.

The Cape projects so sharply into the sea that it forms a good lee with sufficient protection under the South side for a safe anchorage during heavy northwest weather.

The small steamer trading to the Nestuggah River uses it as a shelter in the summer winds.

At the time we passed it, close to, it seemed as if the large swell of the Pacific reached the main shore in full force, and would thus prevent a boat landing there.

There are no dangers off the face or sides of this Cape; in the large swell from the northwest there is no break except at the very base of the outermost cliffs, which are one hundred and twenty-five feet high to the first step.

The north side of the Cape runs northeast half east one and three-quarters miles to the straight shore, thence to the Na-ta-ats River under Cape Meares.

This north side of the Cape is one and three-quarters of a mile in length and is very bold and clean for the first mile; then the face is in places broken down, and is marked by caves and cascades.

When the Cape is approached from the southward, and the vessel is abreast the Haystack Rock, it appears as the point of a great wooded flat pyramidal mountain, stretching about five miles inland where the land falls away to low ground for several miles, and a pyramidal mountain shows far beyond over this low country. At the eastern foot of the Lookout Mountain, just over a low line of trees, there is seen a white line inside the shore, being the sandy hills and the streaks of drifting sand northward of the Nawuggah River.

In the deepest part of the bight under the Cape there is a great fresh land-slide (1887); the top of this break is nearly eight hundred feet high, and within a third of a mile the land reaches an elevation of fifteen hundred feet, and is heavily wooded.

As seen from the southwest the top of Lookout Mountain appears nearly flat, and the long slopes to seaward ends abruptly with the white cliff at the extremity of the Cape just inside a higher wooded head beyond. The top of the mountain is three and three-quarters miles north forty-eight degrees east (N. 48° E.) of the extremity of the Cape, and we judged this to reach three thousand feet elevation, but this may be an exaggerated estimate. Inside of this summit the land drops to the eastward.

From the south-southwest the regular form of the mountain stands out very conspicuously.

The crest of the Coast Range mountains lies twenty miles to the east of Cape Lookout, with some transverse flanking ridges stretching a few miles to the westward. It is therefore very likely that a vessel close under the coast line, with the Coast Range hidden by clouds, and the low land by haze or smoke, would make Cape Lookout and Lookout Mountain as a large island.

When seen from the west-northwest, twelve to fifteen miles distant, the Cape seems more evenly flat-topped, and the Coast Range mountains is seen over its Southern slope, while the higher part of the mountain is marked by a notable gap in which stands a single tall tree. The crest-line of the Cape and mountain is somewhat more irregular from this direction than to the northward and southward. Far to the northeast is seen part of the Coast Range over the north slope of Lookout Mountain. Cascade Head is just visible, but the mountain behind it rises above it. Far on the southeast horizon are seen the tops of the peaks behind Cape Foulweather.

From the northwest, at a distance of sixteen miles, the long crest-line of the Cape is flat, and the face nearly vertical; and in the distance the mountains behind Cascade Head are yet visible; while on the northeast flank of Lookout Mountain the higher mass of the Coast Range is seen.

When a vessel is twenty-four miles to the northwest of the Cape the higher part shows above the horizon as a low table for some distance back to three notches, whence the crest-line rises moderately regular to the high, double-peaked Lookout Mountain.

From the top of the Cape itself, Cascade Head is well outside the Haystack Rock, and far beyond is the point of Cape Foulweather, thirty-two miles distant, and just above the horizon.

The geographical position of the southwest part of the Cape, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	45° 20′ 13″	north.
Longitude	124 00′ 19″	west.
Or, in time	8h 16m 01s.3	

In January, 1885, the magnetic variation was 21° 20′ east, with a yearly increase of 1′.9.

From this cape we have the following bearings and distances to important objects:

Yaquina Heads Light-house, not intervisible	S. 17° E.	39¾ miles.
Cape Foulweather	S. 16½° E.	34½ miles.
Cascade Head	S. 20° E.	17½ miles.
Cape Meares	N. 14° W.	9 miles.

The three arch rocks off Cape Meares are half a mile outside this course and one and five-eighths miles south of the Cape.

Tillamook Rock Light-house	N. 21° W.	35½ miles.
Cape Disappointment Light-house	N. 25° W.	56 miles.

Tides.—The heights of the tides are the same as given in the tables for Astoria; the times are thirty-six minutes earlier than at Astoria.

The Forty-ninth Congress appropriated money for the building of a Light-house at Cape Meares or some other available place.

The water is very bold off the Cape, and two miles to the southwest there is a sounding of twenty-nine fathoms. Tebenkoff lays down fifty fathoms of water over sandy bottom, broad off the face of the Cape, but it is more than likely he took this from Vancouver's chart. Thirteen miles off shore in this latitude Tebenkoff lays down the current running to the northward.

The name Cape Lookout was first given by Meares in July, 1788, to the Cape, which he fully described as having the three large rocks off it, and which he "judged" to be in latitude 45° 30′. Meares gives a crude view of his Cape Lookout, with Tillamook Bay to the northeast of it; yet his legend is wildly in error and does not agree with the text of his narrative. Nevertheless the three arched rocks clearly indicate that this Cape was not the one to which he applied the name.

Vancouver recognized the Cape from Meares' description. Tebenkoff has no name to this Cape. The present name was applied on the Coast Survey charts of 1850 and 1853 to the Cape which we have just described in latitude 45° 20′, and has been retained. The Cape Lookout of Meares is in latitude 45° 29′, and is known as Cape Meares. De Mofras has Cape Lucuat in about latitude 45° 16′, with the River Kaouai three or four miles south of it.

The Bell Fishing Bank.—Trustworthy reports (June, 1889) locate a fishing bank eight miles north and seven miles west of the Nestuggah. It has twelve to fourteen fathoms upon it, but its extent has not been determined; on one side the soundings indicate that the bank is steep to. It is evidently on the prolongation of the promontory of Cape Lookout to the southwestward, but the distance therefrom may be two and a half or six miles according to the meaning given to the reported courses.

The bank abounded in cod-fish, which were quite large (1889), and the year before large halibut were taken in that vicinity, but the bank was not then found.

The bank has been named after the discoverer, Captain Bell, of the steamer *A. B. Field.*

Captain Bell states that this bank lies about six or eight miles southwest by west (SW. by W.) from the Haystack Rock.

It was found while fishing, and was judged to be a bank, and not a ledge, because no hooks were lost in drifting, and because small shell fish or sea clams were found in the stomachs of the fish. Fifty large cod-fish were caught, and after drifting an hour towards the shore the fishing was again tried, when no bottom could be found with fifty fathoms of line.

There is a probability that this bank may be connected with the Doig Ledge, page 430.

THE NA-TA-ATS, OR OYSTER BAY.

Two or three miles Northward of Cape Lookout the land falls to a low, narrow sand peninsula, which stretches north fourteen degrees west (N. 14° W.) for four and three-quarters miles. The sand dunes on this spit show in broken lines of white when seen from about ten to twelve miles seaward. Behind it lies a broad bay or lagoon four miles long, with an average width of one mile. It opens to the ocean at the north end of the sand spit within one and a half miles of the

southern slope of the high land from Cape Meares. The southern point of the bay reaches within a mile of Cape Lookout; the peninsula is only one hundred yards wide, and the bluffs twenty to thirty feet high.

This bay has an extensive area of water at high tide, but at low tide the whole is a nearly bare sand and mud flat. In these flats are vast numbers of oysters and clams.

The southeast shore is bordered by heavily wooded ridges; and the north shore by broken bluffs from thirty to one hundred and fifty feet high. The north shore of the entrance is a bold shore-line and the south sand point lies abreast some low, rocky cliffs under it. These cliffs lie six and one-half miles north four degrees west (N. 4° W.) from the northwest point of Cape Lookout. To the eastward of this bay there are low, bare green slopes, and behind these a wooded ridge of spruce forests and groves of alders. From these hills the principal drainage is by small tributaries coming from the northeast towards the headwaters of Trask's River, which empties into the southern end of Tillamook Bay. The crest-line of the Coast range of mountains is twenty miles to the eastward, with high and regular outline.

As early as 1867 schooners had entered this bay for oysters.

The end of the long, low, sand spit from the south inclosing and forming Nataats Bay is narrower at the point, and for a mile is flat and but little raised above the high water. It then expands to half a mile in width, with low sand hills twenty to twenty-five feet high, with coarse grass, low sallal bushes, and small bull pines.

A colony of about two hundred and fifty seals frequent the sand spits at the mouth of the Bay.

The north shore of the bay is formed by the lower terminations of about ten long, transverse ridges, from two to four hundred feet high and not wooded. The gulches between these ridges are wooded. The shore ends of the ridges are cliffs from twenty to one hundred and fifty feet above the water. Some of the slopes running down to the bay are covered with and marked by coarse and scrubby pines.

The entrance is narrow, but the course is straight and the channel runs directly towards the summer swell (1887). There was then perhaps nine feet of water on the bar, with only one breaker at low water, and none at high water.

The channel is reported to be narrow and changeable, with hard, sandy bottom and a depth of six or seven feet. It opened close under the high northern bank.

This bay was formerly called Nat a-hats; on one of the sectional maps it is called Netart Bay; and on another sectional map of Oregon the village of Netarts is located on the Northeast shore.

Nataats Bay to Cape Meares.—One and a half miles north of the entrance to Nataats Bay the sand beach, backed by cliffs from fifty to one hundred and twenty feet high, ends abruptly at and against the rocks at the Southern part of Cape Meares. This beach is broad, flat, and beaten hard by the sea; above the cliffs are sand hills which reach one hundred and fifty to three hundred feet, and these are a notable feature and a good landmark. The rocks at the north end of the beach as well as the shore of the Cape are basalts of the same character as Cape Lookout.

CAPE MEARES AND THE THREE BROTHERS.

This Cape is the termination of a wooded spur or mountain ridge coming from the southeastward for a few miles, with a gradual increase of elevation to about twelve hundred feet, and then a decrease to the face of the cliffs. It presents an abrupt front to the ocean, and projects nearly three-quarters of a mile beyond the generally straight line of coast.

One and a half miles southeast of it are the sand covered hills, sparsely wooded, and from one to two hundred feet high, rearhing towards the entrance to the Nataats or Oyster Bay, and on the north side is the long, low shore of the peninsula forming Tillamook Bay; both these shores recede slightly to the eastward.

About eighteen miles to the northward is the outstretching head of Cape Falcon, so that a vessel coming from the southward will have Cape Meares projected upon the background inside of Cape Falcon.

The face of this Cape is high, rocky, and broken by barrancas. The whole breadth of the Cape, from the sandy hills on the south to the sand beach on the north side of it, is one and seven eighths of a mile north-northwest and south-southeast. The southern part of the Cape has less height and is not so far projecting, but off it lies the well-known group of the three Arched Rocks.

The rocks at the end of the beach on the south approach and the shore of the Cape are basalts of the same character as those of Cape Lookout.

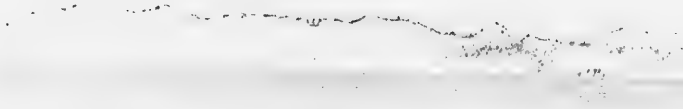
Cape Meares,
NE. by N. ¼ N., 15½ miles.

Three Arch Rocks.

Nestuggah River.

Haystack, 327 feet.

Cas



Gap, with tree.

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Cascade Head, SE. ¼ S., 26 miles.

Cape Lookout, E. by S. ¼ S., 12½ miles.

The most westerly point of this head is a fern and brush covered, narrow promontory running down for one-quarter of a mile with a gentle slope to the crest of the narrow cliff, two hundred and thirty feet high. Just north of this cliff the cliff is four hundred and sixty feet high, nearly vertical, and the top wooded to the edge; behind it the head rises to six hundred and fifty feet and then falls to five hundred and fifteen feet in a quarter of a mile, forming a distinctly marked saddle. This northern half of the Cape is more massive and higher than the southern part, and is more heavily wooded, with a thick forest of spruce.

The basalt of Cape Meares is black, solid, and homogeneous, and in some places prismatic and columnar. It is covered with reddish clay constantly slipping away. An immense fresh land-slide of very recent date exists (1887) on the Northwest face of the Cape and is a prominent landmark.

The north side of the Cape is about one-quarter of a mile deep east and west; it is a perpendicular wall of basalt about one hundred feet above the water, and is worn near the sea level into a row of deep caverns which look like the embrasures of a fortification.

There is a fairly distinct ridge running to each part of the Cape, with a rocky beach and moderate cliffs for three-fifths of a mile between them; but the whole head stands out as a mountain mass, when the low country around it is in haze or smoke, the more especially as the coast-line of the Coast range is twenty miles to the eastward.

The southern part of the Cape is moderately low at the ocean front, then rises within one-sixth of a mile into an irregular hill five hundred and fifty-two feet high, with a depression inside, and then rises to the higher mountain mass to the eastward.

This five hundred and fifty-two feet hill is, without any reason whatever, known as Bald Mountain.

The Three Brothers.—Directly under the face of the southern Cape are rocks extending out one-sixth of a mile; and then a cluster of rocks made up of three principal ones and three or four smaller one. These three large rocky islets are known as the Three Brothers. Approached from the southward, when a vessel is well in shore, four large brown rocks show off this part of the Cape, and three of these have arches through them.

These notable landmarks extend seven-eighths of a mile southwest from the southern part of the Cape, and show as four. The outermost one to the southwest is comparatively small and lies close under one that is two hundred and seventy-six feet high; the second is two hundred and fifty-eight feet, and the innermost and largest one is three hundred and four feet high. The arches through these rocky islets are seen only from particular directions. The innermost islet presents to the north and to the south a straight ridge, like a house, and the arch is moderately small and only visible, when a vessel is close under the shore, from the southward or northward; the outermost high islet has a small arch visible from the south one-half east or north one-half west; and Meares Arch, which is the middle and lowest of the three, has an arch quite broad and extending fully one-half the height of the rock above the water; this islet shows as slightly double-headed. Close under the inside of the innermost islet are two or three low rocks.

The Three Arch Rocks.—It is a curious fact that when the "Three Brothers" are seen from the land, and bearing west southwest one mile distant, there is an arch about twenty-five feet high in the comparatively low black rock which is just inside the Inner Arch Rock. Thus this group is remarkably distinguished by four separate but adjacent arched rocks. There is a group of low rocks around the base of the Inner of the three large Arch rocks occupied by five or six hundred sea lions, whose barking is heard two or three miles distant when the wind is favorable. The low rocks close outside of the outside one of the three Arch rocks are black, and probably twenty feet above the water. The mineralogical character of the rocks is not known. All of them look to be very colored from guano in summer-time.

The northern part of the Cape, or the Cape proper, exhibits rocky, precipitous cliffs, reaching four hundred and sixty feet above the sea, and attaining six hundred feet elevation in one-eighth of a mile. It shows a thin, bright stratum of yellow earth at about two hundred and fifty feet above the sea. The most projecting part of the Cape is a narrow spur reaching out about three hundred yards, with a front two hundred and thirty feet in elevation. This point has nearly a level summit and is not wooded, but covered with sallal and salmon berry bushes, and has a good spring of water. One-third of a mile to the northwest from this point is a solitary pillar-like rock seventy-six feet high, which from the northward leans a little outward. Three-fifths of a mile northwest from this point is a second rock one hundred and nine feet high, looking like a great haystack leaning outward. The longer direction is north-northwest and south-southeast.

From this rock Green Hill on the north side of the entrance to Tillamook Bay bears north eight degrees east (N. 8° E.), distant four and one-half miles.

The projecting cliff of the North Cape has been proposed as the site for a sea coast Light-house of the first order.

From the face of the high cliffs of the Cape the land rises into a head about six hundred and fifty feet above the sea, and then falls to five hundred and fifteen feet, and rises to a second hill; both these features are well seen from the southward. All the surface of the head and mountain back is covered with a dense growth of fir and hemlock; and the northern slope of the high ridge is the southern boundary of Tillamook Bay.

When Cape Meares is seen from the southwest by south at fifteen miles distance, the rocky cliffs of its face show a little less than one-half the height of the head, already described. Beyond and over the Cape is the high line of the Coast Range. To the southeastward of the cliffs are seen the Three Brothers. The high part of the mountain behind the Cape has two detached summits, with a low line of whitish, sandy ridges under the southeastern heights. Between these cliffs and the mountain behind Cape Lookout is the low area of Oyster Bay, with a pyramidal peak of the Coast Range in the distance; farther to the south is seen Cape Lookout, and still farther the land inside of Cascade Head.

When the Cape is seen from the west-southwest, at ten or twelve miles distance, the whole rocky face is visible, with the Three Brothers to the southeastward, and the peak of the mountain shows over the space between the cliffs and the rocks. East of the rocks the low line of cliffs is seen, and farther east and south the sand dunes on the south peninsula of Oyster Bay. Behind these sand dunes is a low, wooded country over which is seen the high Coast Range. Away to the southward the features of Lookout, Cape and Mountain, and the mountain behind Cascade Head are seen; while still farther south, in moderately clear weather, the mountain tops behind Cape Foulweather show broken on the horizon.

When a vessel is northward of the Cape the low land of the Tillamook Bay country is seen reaching far inland, with the high Coast Range beyond and over it.

When we were a little north of the Cape and close inshore, with the Three Arch Rocks showing clear of the Cape and projected on the highland behind Cape Lookout, the first rise of the face of the cliff, which is the projection two hundred and thirty feet high, is quite sharp to a small flat summit with a notch inside of it, and then a saddle still deeper until the land rises regularly.

The geographical position of the proposed Light-house site on the outermost point of Cape Meares, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	45° 29′ 06″ north.
Longitude	123° 58′ 41″ west.
Or, in time	8h 15m 54s.1.

In January, 1885, the magnetic variation was 21° 20′ East, with an annual increase of 2′.0.

From Cape Meares we have the following bearings and distances to prominent objects:

Cape Orford Light-house	S. 12½° E.	161½ miles.
Cape Gregory Light-house	S. 14° E.	130 miles.
Yaquina Heads Light-house	S. 15½° E.	49 miles.
Tillamook Rock Light-house	N. 26° W.	27½ miles.
Cape Disappointment Light-house	N. 26° W.	48½ miles.

The Forty-ninth Congress made an appropriation for the building of a Light-house at Cape Meares or at Cape Lookout. In the second expedition for the exploration of the coast in 1775 under Heceta* and Bodega the former says (August 18, 1775):

A mountainous plain which I called La Mesa will cause all navigators to lay to in the vicinity of Cape Falcon, and although I took no observation it is in latitude 45° 28′, and it can be seen from afar to be of medium height.

Bodega under the same date says that:

In latitude 45° 28′ there is a hill, flat, and table-like which from being moderately elevated made itself visible to the navigators. In latitude 45° 30′ there are three Farallones which we have named Las Tres Marias.

In July, 1788, Meares in the *Felice*, after passing Cape Falcon from the northward, says:

The distant southerly land we called Cape Lookout. This cape is very high and bluff, and terminates abruptly on the sea. At about the distance of two miles from it there rose three large rocks, which are remarkable for their

*Segunda exploracion de la Costa Septemtrional de la California en 1775 con la fragata Santiago y goleta Sonora mandadas por el Teniente de Navio Dn. Bruno de Heceta, y el de fragata Juan de la Cuadra, desde el Puerto de San Blas hasta las 58° de latitud. (Mss. in State Department, Washington.)

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Cape Meares. Entrance Oyster Bay, SE. ¼ E., 19 miles. Three Arch Rocks. Cape Lookout, SE. ¼ S., 24 miles.

Tillamook Bay, E. by S. ½ S., 14 miles. Cape Meares.

Tillamook Rock and Head, 1,280 feet, NE. by N. ½ N., 1[illegible] miles.

Pyramid Rock. Cape Meares, NE. by E. ½ E., 11 miles. The Three Arch Rocks.

Cape Meares. Fourth Arch. The Three Arch Rocks (Approx. SE. ½ S., 2 or 3 miles).

The Three Arch Rocks.

Na-ta-ahts, or Oyster Bay (chart Netarts).

The Three Arch Rocks
Approx. SE. ¼ S., 2 or 3 miles).

Cape Lookout.

great resemblance they bear each other. The middle one has an archway, perforated, as it were, in its center, through which we plainly discovered the distant sea. * * * Their distance from each other might be one-quarter of a mile, and we gave them the name of the "Three Brothers." * * * We judged Cape Lookout to lie in latitude 45° 30' north.

He gives a very curious sketch of the cape, rocks, and Tillamook Bay.

In April, 1792, Vancouver described it as "a small projecting point, yet remarkable for the four rocks which lie off it, one of which is perforated as described by Meares." He places it in latitude 45° 32', and passed it within four or five miles.

Tebenkoff calls it Cape Lookout and places it in latitude 45° 31'.

This cape is very frequently, but erroneously, stated to be the "Clarke's Point of View," as described by Clarke in the winter of 1805–'6. (See remarks upon Tillamook Head.) Lewis and Clarke probably saw the high faces of Capes Lookout and Meares from Tillamook Head over the extremity of Cape Falcon, and relying upon the rough delineations of the Indians that the distant point of land visible to them formed the seaward side of Tillamook Bay, they have charted it as such and named it Cape Lookout, but they do not mention it in their narrative. They place it in latitude 45° 20'.

The Indian name for the Cape is Nascowitzen.

We applied the present name to the Cape in 1857 because the name Lookout had been previously applied to the Cape eight miles southward.

The views of the U. S. Coast and Geodetic Survey give the general characteristics of the cape and mountain, and the details of the Three Brothers.

TILLAMOOK BAY.

The entrance to this bay is four and a quarter miles north from the pyramidal rock off the northwest face of Cape Meares. The northern side of this Cape slopes rapidly to the northward, and the shore-line recedes half a mile to the northeast by east (NE. by E.), whence it runs in a nearly straight line north by west (N. by W.) for three and three-quarter miles to the mouth of Tillamook Bay. This long, low shore-line is the ocean side of a sandy peninsula forming the boundary of the Bay, which heads within one third of a mile of Cape Meares. The peninsula is narrow and bordered by a broad, low-water sand beach. It is formed of low sand hills, partly grass-covered, for two miles from the Cape, and then widens to half a mile for the distance of a little over one mile. As this widening is reached the sand hills are about forty or fifty feet high, and are grass covered. Behind them on the bay shore are open groves of spruce trees which show seaward over the dunes.

At the northern end of the sand dunes, which is named Kincheloe Point, is the entrance to the bay, directly abreast of the steep fern-covered slope known as Green Hill, which bears almost exactly north from Kincheloe Point. The entrance is one-third of a mile wide.

The north point of the entrance to the bay is the southern termination of a high, wooded ridge reaching seven and a half miles from the inner part of the Nehalem River entrance. The ridge is twelve hundred and fifty to thirteen hundred feet high at the northward, decreases to one thousand feet a little south of the middle, and rises to sixteen hundred and fifty feet a mile and a half north of Green Hill. The seaward face of this ridge is densely wooded, and the only change of appearance thereto is at Green Hill, which is one mile inside the general coast direction, and shows as a bright green spur, covered with fern and bushes. This hill-face is a prominent feature in recognizing the entrance and crossing the bar. The highest part of the hill-face that is destitute of trees is about four hundred and twenty-one feet, and its breadth at the base one sixth of a mile. The lower part can be seen around as far to the northward as west-northwest.

Stretching out to the west-northwest from Green Hill, the sand beach gradually widens and forms a mile long rounding point, reaching sixty feet high at four hundred yards from the shore, and beyond this the fern-covered face rises steeply to one hundred and twenty feet; behind this is dense forest.

When a vessel is abreast the bay the water can be seen over the low southern spit from aloft; and the general appearance from seaward, at ten to fifteen miles, suggests a great bay with Cape Meares and its ridge to the southward, the high ridge of La Mesa to the northward, and far distant over the low intervening area is seen the near spur of the Coast Range from the northeast, and the distant crest-line of the main range. The fir trees on the low peninsula show as an irregular dark line.

The approaches to the bay are free of immediate dangers; there are no known rocks along the southern low peninsula, and the rocks along the coast to the northward are quite close inshore. At two miles from the entrance, or one and a half miles broad off the shores north and south, the depth of water is fifteen or sixteen fathoms over a bottom of fine red sand and black specks. Under the north shore, at two miles above the entrance, lie two rocks north and south of each other and almost touching at the surface of the water. The southern one is about ninety yards in extent and slightly the larger and higher. It is eighty-eight feet high and has an arch through it as seen from the south. The northern one is seventy-three feet high. They lie nearly eight hundred yards from the high-water beach, which is here one hundred and fifty yards wide; the low-water beach is one hundred and thirty yards wide. When we passed these rocks they appeared as a single double-headed one; they were gray in color and were readily recognized as seen projected against the bright sand beach beyond.

The area of the Bay is between twelve and fifteen square miles, and it consists mainly of large flats and shoal places, with no important channel at low water. The entrance is about six hundred yards wide, and the channel thence to the bar is one and one quarter miles long. The deepest water is under the Green Hill, or north side, where depths of forty and fifty feet are found, but between the twelve feet curves it is nowhere less than one hundred yards wide, and carries eighteen feet through a narrow lane to the bar. The bar, at the time of the first survey (1867), was west half south from the foot of Green Hill, and a depth of fifteen feet could be carried over it within narrow limits; between the twelve-feet curves on either side it was four hundred yards wide north and south, although there was a narrow twelve and a half feet middle ground just under the south side of the channel. The breakers always show the south side of the channel. The distance across the bar was less than one hundred yards.

Although no complete re-examination of the bar, channel, and approaches has been made, yet sufficient soundings have been made to properly locate the buoys, and changes are known to have taken place. In the Buoy-list of October, 1885, it is stated that there was then only seven feet of water on the bar; but in October, 1886, the report made to the Light-house Inspector was that a depth of sixteen feet at high water could be carried over it. Notwithstanding frequent and minor changes, the general statement is made by vessels trading there that for twenty years the bar has been very close on the range of Fuller's House and the rock lying nearly two hundred and fifty yards west by south half south (W. by S. ½ S.) from it. In 1886 two small steamers and a schooner were trading between Astoria and Tillamook Bay, and the Light-house steamer, drawing eleven feet of water, has been inside the entrance to locate the buoys.

Inside the entrance of Tillamook Bay its general trend is south-southeast for two and a half miles; then east-southeast for two and a quarter miles. It rapidly expands as it stretches southward. Half a mile east from Green Hill is *Bailey Point*, just to the northeastward of which is a narrow, treeless flat under the high, wooded shore; on this flat is located the settlement formerly known as *Garibaldi*, and which in 1875 consisted of a store, post-office, and a few other houses. This place is now generally known as Hobsonville. Between Bailey Point, on the west-northwest, and Memaluct Head, on the east-southeast, a shallow cove makes in to the northeast for one mile, and into the head of it empties the *Miami River*, a small stream coming from the northeast. *Memaluct Head*, the northeast point of the bay, is low, narrow, and bare of trees for a short distance inland. On the northwest angle of the point is situated a saw-mill, which lies south seventy-seven degrees east (S. 77° E.) one and three-eighths miles from the base of Green Hill; and on the southeast side of Memaluct Head, one-quarter of a mile from the point, is a small cannery at the outer end of a short wharf. There is very little water at either place.

The next two points on the eastern shore of the bay are *Sandstone Point* and *Shell Point*. The former lies south forty degrees east (S. 40° E.) one and one-eighth miles from Memaluct Head, is wooded to the water's edge, and has ten to eleven feet of water close off it. The latter lies on the same bearing nearly two and a half miles from Memaluct Head, is sparsely wooded, and has shoal water off it.

The first point in the southwestern part of the bay is *Pitcher Point*, three and one-sixth miles south thirteen degrees east (S. 13° E.) from Green Hill, and lying three quarters of a mile from the Ocean beach abreast the narrowest part of the peninsula, which is here about one hundred and fifty yards across. The point is wooded to the water's edge, and the bay is shoal for one-third of a mile out from it. From Pitcher Point the south shore stretches nearly east-southeast for three miles to the mouth of Trask Creek.

The bay is mostly filled by flats that are bare at low water. The principal channel through it runs from the inner side of Kincheloe Point, the south point of the entrance, diagonally towards the southeast part of the bay, and when abreast of Shell Point it breaks up badly. Another channel runs from Bailey's Point, nearly straight for Memaluet Head, thence past Sandstone Point nearly to Shell Point, where it flattens out.

BUOYS AND SAILING DIRECTIONS.

Aids to navigation have been placed to mark the bar and channel as follows:

Tillamook Bar Buoy.—This is a *second-class can-buoy painted with black and white perpendicular stripes.* It is placed outside the bar in twenty-one feet of water over sandy bottom, with seven fathoms close outside of it, and sixteen fathoms half a mile to the westward.

From it the following bearings and distances are given: Double-headed Rock under the north shore bears north half west (N. ½ W.), distant one and one-third miles; and summit of Green Hill bears east half north (E. ½ N.), distant one and two-thirds miles. Black Buoy No. 1 lies on the line to Green Hill and distant seven eighths of a mile from the Bar-buoy.

From this buoy steer east one-quarter north (E. ¼ N.) which course leads directly towards Bailey Point and midway the buoys marking the north and south breakers; when up with the rocks under Green Hill, run parallel with the shore to Bailey Point, avoiding the sunken rock lying a quarter of a mile southwest from it and marked with a buoy, and anchor about one-quarter of a mile to the southeast of the village in from eight to thirteen feet of water.

North Spit Buoy.—This is a *third-class nun-buoy, painted black* and *numbered* 1. It is placed in twenty-eight feet of water over sandy bottom on the north side of the channel inside the bar. The following bearings and distances locate this buoy: Double-headed Rock, off the north beach, bears northwest by north (NW. by N.), distant one and seven-eighths miles; Fuller's Rock, close under the north shore, bears east by north (E. by N.), distant nearly half a mile; Saw-mill on Memaluet Point bears east three-quarters south (E. ¾ S.), distant two and one-eighth miles, with buoy on sunken rock off Bailey Point in line and distant one and one-tenth miles; Red Buoy No. 2, on the south side of the channel, bears east-southeast (E. SE.), distant three-eighths of a mile.

Fuller's Rock, here referred to, lies nearly on the edge of high water one-quarter of a mile northwestward from the ninety-five feet rock close under the southwest face of Green Hill. Fuller's Rock is about forty feet high, pyramidal in form, and has a few bushes and some grass on the top.

South Spit Buoy.—This is a *third-class nun-buoy, painted red* and *numbered* 2. It is placed in twenty-seven feet of water over sandy bottom on the south side of the channel close under the breakers, and the following bearings and distances locate it:

Fuller's Rock bears northeast by east half east (NE. by E. ½ E.), distant four hundred yards; Bailey Point bears east one-third north (E. ⅓ N.), distant seven-eighths of a mile; Saw-mill on Memaluet Point bears east three-quarters south (E. ¾ S.), distant nearly one and three-quarters miles, with the buoy off Bailey Point nearly in line and three-quarters of a mile distant.

Buoy off Bailey Point.—This is a *third-class nun-buoy, painted with black and red horizontal stripes.* It is placed in twelve feet of water, over hard bottom, close to a *sunken rock* lying one-quarter of a mile southwest (SW.) from Bailey Point. It should be left on the starboard hand going in. The sunken rock lies close under the southeast side of the buoy.

The following bearings and distances locate this buoy: Left tangent of the base of Green Hill bears northwest by west one-third west (NW. by W. ⅓ W.), distant three-eighths of a mile; the houses on Bailey Point northeast two-thirds east (NE. ⅔ E.), distant one-quarter of a mile, and Saw-mill on Memaluet Head east two-thirds south (E. ⅔ S.), distant one mile.

The geographical position of the U. S. Coast and Geodetic Survey station of Green Hill is as follows:

Latitude	45° 33′ 39″.2 north.
Longitude	123° 56′ 00″.0 west.
Or, in time	8h 15m 44s.0.

In January, 1885, the magnetic variation was 21° 22′ East, and the yearly increase was 2′.0.

Tides.—The Corrected Establishment, or the mean interval between the time of the Moon's meridian transit and the time of high water, is XIIh 09m, and the difference between the greatest and least of these intervals is 1h 31m. The mean rise and fall of the tides is six feet; of spring tides seven and four-tenths feet; and of the neap-tides four and six-tenths feet. When the

Moon's declination is greatest north the high waters for the Moon's upper transit are seven and three-tenths feet above the plane of reference, and the low waters six-tenths of a foot below; and for the Moon's lower transit the heights are respectively six and two tenths feet and two feet above the plane of reference. When the Moon's declination is greatest south the high waters for the Moon's upper transit are six and two-tenths feet above the plane of reference and the low waters two feet above; and for the Moon's lower transit these quantities are respectively seven and three-tenths feet above and six-tenths of a foot below the plane of reference. At the full and change of the Moon the high waters of the spring tides are one-half of a foot higher, and the low waters seven-tenths of a foot lower than the above. At the Moon's first and last quarters the high waters are one-half of a foot lower, and the low waters are seven-tenths of a foot higher than the above.

To find the times and heights from the Coast Survey Tide Tables, published annually for the Pacific Coast, take out the times and heights for Astoria for the required date; then from the given time of high water subtract thirty-six minutes, and from the given height subtract five tenths of a foot; from the given time of low water subtract thirty-six minutes, and from the given height subtract three-tenths of a foot.

Several streams flow into Tillamook Bay, and the region is well wooded and watered. There is said to be a population of nearly one thousand on the bay and the tributary rivers. A road runs from the county town of Tillamook, at the southeastern part of the bay, over the mountains to the Willamette valley. Vessels have been built here; and in summer regular communication by water is maintained between this bay and Astoria.

In July, 1788, Meares, coming from the northward, was searching for the Columbia River, missed it but called the broad estuary of its mouth Deception Bay, and when up with Tillamook Bay he gives a view of the latter as seen over the low peninsula. He says (pp. 168, 169):

> A large opening appeared ahead, which once more animated our hopes, and formed a new source of disappointment. In the offing it blew very strong, and a great westerly swell tumbled in on the land. By seven o'clock [in the evening] we were abreast of this opening, the mouth of which, to our great mortification, was entirely closed by a low, sandy beach, nearly level with the sea, which appeared to flow over it, and form an extensive backwater; beyond it an open champaign country extended to a considerable distance where it was confined by a boundary of lofty mountains. The bay was named Quicksand Bay, and an adjoining headland Cape Grenville; the distant southerly headland we called Cape Lookout. [Cape Meares.]

Vancouver (April, 1792) has a deep recession of the shore at Tillamook Bay, but he did not see the sand peninsula separating it from the ocean. He notes the Double-headed Rock to the north of the Bay, but gives no names. Tebenkoff copies Vancouver but adds a river coming into the southeast part of this deep bight and names it the River Nikas.

The bay is named from the tribe of Indians who inhabited this region in the time of Lewis and Clarke. These early travelers did not, however, visit this locality, but obtained their information from the Indians about the Columbia. They were a few miles south of Tillamook Head, and represented the Bay of the Killamucks very nearly in its actual shape. The northern point of the long, seaward peninsula stretching from the south they called Cape Lookout, but it is not mentioned in their narrative.

The U. S. Coast Survey published the first chart of Tillamook Bay in 1867.

CAPE LA MESA.

North of Tillamook Bay the coast is almost a straight line for four and one-third miles to the mouth of the Nehalem River, and then falls back slightly to opposite the turn of that river; but thence it continues straight for ten miles towards the peak of Neah-kah-nie Mountain. The high land back of this shore, from Tillamook Bay to the turn of the Nehalem River, is Cape La Mesa.

In strictness this is not a cape, but a high, densely wooded ridge, ranging from sixteen hundred and fifty feet elevation at the southern part to one thousand feet at the middle, and again rising to thirteen hundred feet. The seaward face is abrupt but covered with a forest of fir that comes down to a slight bluff at the inner edge of a line of sand. Under the wooded slopes there is a line of five lagoons surrounded by forest and opening by narrow water-ways to the ocean. At the base of the southwest part of this high ridge the sand dunes reach sixty feet elevation, then change into grass and fern which cover the dunes to one hundred and twenty feet elevation.

Two miles from the southern end of this high ridge, and lying seven hundred yards from the shore, are two rocks whose bases are so close together that they are generally supposed to be one,

and have been named (1867) the *Double-Headed Rock*. The southern one is slightly the larger, being seventy yards in extent and rising to eighty-eight feet. The northern one is slightly smaller and is seventy-five feet high. The southern one has an arch through it as seen from the southward. Both were gray (July), and from a mile or two seaward show quite conspicuously on account of the bright sand beach behind them. We saw no breakers near them, nor does the topographical survey indicate any sunken dangers.

The geographical position of the southern peak of the Double-Headed Rock has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	45° 35′ 44″.6 north.
Longitude	123° 57′ 37″.1 west.

The latitude of the south end of Cape La Mesa is given for the highest part of the Mesa about one and a half miles north by east (N. by E.) from the station Green Hill, which overlooks the entrance to Tillamook Bay. It is 45° 34′ 50″ north and 123° 55′ 00″ west, and is one and a half miles east of the shore.

This southern head of the ridge was called Cape Grenville by Meares in July, 1788.

Duflot de Mofras has Cape de la Mesa on Cape Lookout in about latitude 45° 34′.

It is named La Mesa to commemorate the discovery of Heceta and Bodega, who applied this name to a flat-topped mountain in latitude 45° 28′ which they mention as a landfall. At the same time they placed the Tres Marias (the Three Arch rocks) off Cape Meares in latitude 45° 30′. Their "Monte plano á Manera de Mesa" has not been recognized.

THE NEHALEM RIVER.

Five miles northward of Green Hill, at the north side of Tillamook Entrance, the straight line of the shore retreats gradually half a mile in the next one and a half miles and then continues north for another mile and a half. Coming from the north almost to the latitude of this first change of direction is a straight, narrow, sand peninsula, nearly three miles long, and averaging not quite one-third of a mile in width. It is prolonged towards the southern high shore by a sand spit of one mile in length, bare at low water. At the southern end of this submerged sand spit is the entrance of the Nehalem River, which comes close under the high, wooded land on the east, and between it and the narrow sand spit and peninsula. Northward of the entrance, in latitude 45° 41¼′, the high shore turns abruptly to the east northeast for one and three-quarters miles, and forms the south shore of Nehalem Bay, which is here a mile and a quarter wide, although filled with sand flats that are bare at low water and occupy four-fifths of the area. The channel of the river is under the wooded south shore. At the eastern part of the bay the river comes from the north-northeast for about two miles at a point where the north fork, which is the smaller, comes in from the north, and the south fork from the south and east. The river heads in the western flank of the Coast Range, which is about twenty miles in from the coast.

At the time of the survey in 1875 the low-water channel of the river at the entrance was one hundred and sixty yards wide, but at the bend three miles inside it was six hundred and fifty yards wide.

The *Bar* of the river was not sounded, but it was sufficiently near to the observer to be watched from the shore, and for five months they never saw it without a break entirely across it. It was believed to have less than six feet of water upon it. The channel evidently shifts with heavy storms. There appeared times when a small steamer might enter by running through one line of breakers if the exact position of the bar and the depth of water upon it were known. A sailing vessel could not, ordinarily, get in or out because the wind is not steady enough so close under the high eastern shore.

In July, 1867, when we were passing close along the coast, we found the Nehalem opening abreast of the position of the north point in 1875.

In 1868, during the examination of the river, the bar broke continuously and was unapproachable. Inside the bar under the north low-water spit the channel carried sixteen feet of water, but abreast the reef under the east bluffs the depth was scoured out to thirty-two feet. At one and three-quarters miles inside the north sand point (which was then twenty-five feet high), the channel went over to the west bank, carrying fourteen feet of water; and it continued under that shore to the great bend where the depth was ten to twelve feet, with a width of four hundred yards be-

tween the six-feet curves. At high water the sea breaks entirely across the narrow channel as far northward as the sand point, effectually closing the river.

One mile inside the bar, and almost abreast of the south end of the north sand point, there is a ledge of rocks close under the eastern shore but projecting partially into the channel.

Inside, the river is reported to be navigable for vessels of light draught for eight to ten miles. There are reported to be coal deposits on the north fork of the river.

The north point of the river continues northward for three miles as a barren sand peninsula* nowhere reaching twenty feet elevation until the fir forest is reached, at one mile north of the high head inside the river. Thence it continues northward with increasing height and dense forests, except along the immediate shore where there is a narrow line of grassy sand hillocks from forty to one hundred and forty feet elevation.

From seaward the depression of the bay and valley is readily made out as a break two miles in width in the higher coast line.

The geographical position of the station "Keaton," which is under the high, wooded bluffs abreast the bar, as determined by the U. S. Coast and Geodetic Survey, is as follows:

Latitude	45°	38′	35″	north.
Longitude	123	56′	33	west.
Or, in time	8h	15m	46s.2.	

The magnetic variation was 21° 25′ east in January, 1885, with a yearly increase of 2′.0.

One of the features for recognizing this locality is Neah-kah-nie Mountain, five miles to the northward, and lying under Cape Falcon. It is hereafter described.

Lewis and Clarke mention the entrance to the "Nekiee Creek," twenty miles South of Tillamook Head, into a bay which they erroneously state to be the "Killamuck." Their chart gives no name to the bay, but the main stream running into it is "Killamouck River."

Tebenkoff has a stream designated the "Nahalem," emptying into the ocean in latitude 45° 54′, but this position is close under Tillamook Head and doubtless refers to the Ecola Creek under that Cape.

CAPE FALCON (OR FALSE TILLAMOOK).

This cape lies seventeen and a half miles north twenty degrees west (N. 20° W.) from Cape Meares; and ten and a quarter miles north twenty-six degrees west (N. 26° W.) from Double-Headed Rock, just north of the entrance to Tillamook Bay. From the Light house on Tillamook Rock it bears south thirty degrees east (S. 30° E.), distant ten and one-third miles.

Northward of Tillamook and Nehalem Bays the large mountain mass, which embraces the landfall of Saddle Mountain, comes from the northeast and terminates on the coast at the bold head of Cape Falcon, and the still bolder head of Neah-kah-nie Mountain on the south and Arch Cape on the north of it. It presses out so far that it breaks the almost straight line of the coast from Cape Orford, and projects at least two miles outside of the coast-line thence to the Nehalem.

Cape Falcon is the westernmost point of this mountain mass, but it is not the shore termination of either of its two main ridges. It is a spur between these rising from almost vertical cliffs to three hundred and fifty feet in less than one hundred yards, and to seven hundred and twenty-five feet in half a mile. The ocean face is less than half a mile in extent, very jagged, and with rocks close under the cliffs. The extreme southwest point, with cliffs two hundred feet high and nearly vertical, is partially devoid of trees, and a narrow line of fern-covered ground reaches back six hundred and fifty yards along the ridge to a height of three hundred and sixty feet. On each side of this the firs cover the slopes.

There are several rocks, in groups and single, lying within two hundred yards of the cliffs of the ocean face of the cape; but the principal danger is *Falcon Rock*, sixty yards in extent and about fifty feet high, lying two-thirds of a mile west by south (W. by S.) from the southwesternmost point of the cape.

The culminating point of the great cross-ridge back of the cape lies two and two-thirds miles north thirty-four degrees east (N. 34° E.) from the extreme point, and reaches an elevation of twenty-seven hundred and seventy-five feet. This ridge faces broad to the south and is one mile long above the height of twenty-three hundred feet. Its shore termination is at Arch Cape two and a quarter miles north from Cape Falcon.

* For remarks about pieces of wax found on this peninsula, see the historical notes under Point Adams, page 45.

Neah-kah'-nie Mountain.—When seen from the southward the landfall for Cape Falcon is Neah-kah'-nie Mountain, which lies two miles south seventy degrees east (S. 70° E.) from the point of the Cape. It is a double-headed mountain, and its peaks lie eight hundred yards west by north and east by south from each other. The western summit is rounding and rises to seventeen hundred and ten feet above the sea. The eastern summit is slightly serrated and rises in three peaks of almost equal elevation to sixteen hundred and seventy feet above the sea. The depression between the two principal summits is fourteen hundred feet in elevation. It is a notable landfall because the entire southern slope of the mountain, from south-southeast to west by north, is bare of trees and covered with grass and fern. The northern slope is a dense forest, and the tops of the trees show over the summits of the peaks. The grassy south-southeast slope is one mile in length and reaches to the grass-covered sand hills at the northern end of the sandy peninsula from the Nehalem River. The summits of the mountain are less than half a mile from the ocean-face to the southwest, which consists of wild rocky cliffs with rocky shore and a few rocks lying about one hundred yards from the shore. The western point of this ocean-face is a cliff five hundred and sixty feet high only seventy yards in from the base. A few firs stand along the verge of the precipice for two hundred yards to the northwest. Just inside of this western cliff is a slight depression, whence the mountain rises sharply to the western summit.

Between this precipitous face and the southwest point of Cape Falcon the distance is one mile and the bearing northwest by west (NW. by W.); in this distance there is a cove half a mile deep, with a broad, low-water sand beach backed by low, wooded cliffs. Into the southeast part of this cove empties a small stream through a deep, wooded gorge winding round the north slope of the mountain.

From a vessel six or seven miles broad off Tillamook Rock Light-house, with Cape Falcon bearing southeast by east (SE. by E.), distant twelve or fourteen miles, the Cape will appear just inside the high, seaward face of Neah-kah'-nie Mountain, and the two summits of the latter will show with a saddle between them. The Cape itself will appear as a gradual slope from the great cross-ridge, twenty-seven hundred and seventy-five feet high, to the extremity of the point.

Hydrography.—The depth of water around the Falcon Rock is nine fathoms on the outside and eleven fathoms on the inside; and between the rock and three-fathom line around the face of the Cape the width of the passage is a little more than three-eighths of a mile, with a depth of eight fathoms of water close up to the three-fathom line.

Outside the Cape the line of soundings is very regular; at one mile twenty fathoms over fine dark gray sand; at two miles thirty-five fathoms, over similar bottom; at three and a half miles forty fathoms with fine dark-gray sand and coarse gravel; at seven miles fifty-one fathoms, fine dark-gray sand; and at nine miles sixty fathoms over similar bottom mixed with some mud. At twenty-one miles west by north three-quarters north (W. by N. ¾ N.) from the Cape the chart gives eighty-five fathoms of water over muddy bottom; and at twenty-seven miles west half north (W. ½ N.) one hundred and thirty fathoms of water over mud.

From Cape Lookout to this Cape a depth of twenty fathoms is generally found one mile from the shore, and forty fathoms at four to five miles. These distances and depths hold to the northward as far as Tillamook Head, but north of that the immediate coast plateau widens considerably.

Vessels should not approach this part of the coast within a mile or mile and a half, or within a line joining Falcon Rock and Tillamook Rock Light, as there are several dangers on the ten-fathom line. The chart says that in this section of the coast the currents appear to be largely affected by the ebb and flow of the waters in the Columbia River. Between Cape Falcon and Cape Disappointment, for a width of four to six miles off shore, the current is generally to the southward in summer, although it may be reversed by strong southerly winds. In winter the current takes the opposite direction. Nevertheless it is a well-known fact that the prevailing littoral drift close along the shore is to the northward, as will be shown in the description of Columbia River, Shoalwater Bay, and Gray's Harbor.

The geographical position of the westernmost point of Cape Falcon, at the three hundred and fifty feet cliff, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	45° 46′ 04″ north.
Longitude	123 59′ 05 west.
Or, in time	8h 15m 56s.3.

In January, 1885, the magnetic variation was 21° 30′ East, with an annual increase of 2′.1.

From Cape Falcon we have the following bearings and distances to important objects:

Cape Orford Light-house	S. 14° E.	178 miles.
Cape Gregory Light-house	S. 15° E.	146 miles.
Yaquina Heads Light-house	S. 16½° E.	66 miles.
Cape Meares (Westernmost point)	S. 20° E.	17½ miles.
Tillamook Rock Light-house	N. 30° W.	10¼ miles.
Cape Disappointment Light-house	N. 24½° W.	31 miles.

From the eastern summit of Neah-kah'-nie Mountain the great landfall of Saddle Mountain bears north seventeen degrees east (N. 17° E.), distant seventeen and a quarter miles.

In 1775 Heceta discovered this headland and named it Cabo de Falcon; on some charts it was subsequently called Santa Clara de Monte Falcon. Heceta placed it in latitude 45° 43′. It had a rocky islet lying off it.

It is barely indicated on the chart of Vancouver, and is not named.

On the reconnaissance chart of 1850 it was called False Killamook; in 1853 we restored Heceta's name to it, and more especially to avoid the term "false," which was applied to capes adjacent to well-known ones. It is now known to navigators by this name only.

Arch Cape.—From the extreme western point of Cape Falcon the high cliffs run sharply to the north-northeast (N. NE.) for one mile, thence as low bluffs for one and three-eighths miles north by west three-quarters west (N. by W. ¾ W.) to Arch Cape.

This Cape hardly projects beyond the comparatively low shore on either side, and is important only for being the shore termination of the great cross ridge that comes two and a half miles from the eastward where it is twenty-seven hundred and seventy-five feet high. It is eleven hundred feet high at half a mile from the shore; and at the Cape it is four hundred feet above the sea. This great ridge is visible at sixty miles from shore; it is the main spur coming from the mountains to the east and northeast where they are very much broken. Neah-kah'-nie Mountain is the secondary spur to the southward, and lies nearly parallel with this one.

A small part of the southern side of the end of this ridge, at Arch Cape, is covered with fern and scattering firs. The cape is rocky and precipitous for about one-quarter of a mile of the face; towards Cape Falcon there are a few low, broken bluffs. Except on the end of the cape, and these low bluffs, the whole country is densely covered with forests, which come down to the water's edge. On the north side of the cape the shore sinks suddenly to a short, low, sandy reach, just above high water. The low-water beach under the cliffs south and north of the cape is as much as two hundred and seventy-five yards broad, but immediately off the extremity of the cape it is only ninety yards in width.

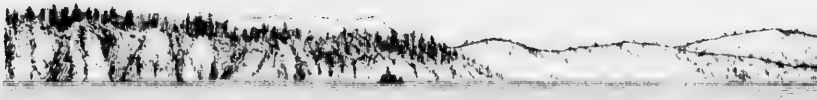
Directly under the cape, and almost touching it, is a rock fifty yards in extent and one hundred and twenty feet high. It has a small arch through it, parallel with the beach and not visible from seaward. It lies inside the low-water line, and can be passed through. Just outside of this rock, and on the edge of the low-water line, is a small rock twenty-five feet high. The cape takes its name from the small arch above mentioned.

Off the Cape are some rocks and one *hidden danger*. The outermost visible rock is one hundred yards in extent and one hundred and thirteen feet high. It lies eight-tenths of a mile west one-third north (W. ⅓ N.) from the highest part of the cape. It has deep water all around it, and the three-fathom line lies half way between it and the point of the cape. Half a mile outside of it is the fifteen-fathom line parallel with the shore-line. It is called Arch Cape Rock.

At a distance of seven hundred and sixty yards southwest by south half south (SW. by S. ½ S.) from Arch Cape Rock there is a *rock awash* in foul ground, sixty yards in extent. There is a depth of ten fathoms all around it, and it is on the line of the twelve-fathom curve parallel with the shore. From the highest part of the cape this rock bears west by south half south (W. by S. ½ S.), distant one mile.

A *sunken rock*, visible at extreme low water, has been found just inside of the line from the outer edge of Cape Falcon to Arch Cape Rock. It lies one mile south-southwest (S. SW.) from the highest part of Arch Cape; and one mile southeast by south half south (SE. by S. ½ S.) from Arch Cape Rock. This danger lies one-eighth of a mile outside the three-fathom line, and has five and a quarter fathoms inside of it. It lies on the general six-fathom line.

A notable rock under the bluffs south of Arch Cape is just outside the low-water line and far inside the three-fathom line. It is one hundred and ten yards in extent, one hundred feet high, and has three small rocks close under the inside of it. The nearest one is fifteen feet high and



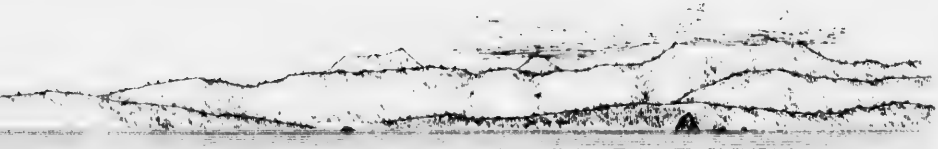
Tillamook Head.

Tillamook Light-house, NE. by E. ½ E., 5 miles.

Towards Point Adams.

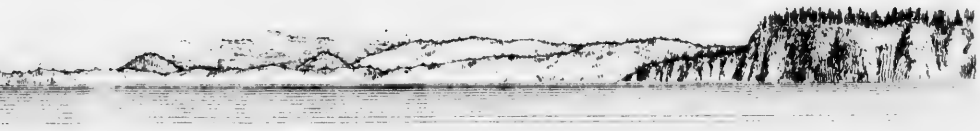
Ne-ah-kah-nie Mountain, 1,600 feet.

Cape Falcon, or False Tillamook.
SE. by E., 12 miles.



, 5 miles.

Mouth of Elk Creek.



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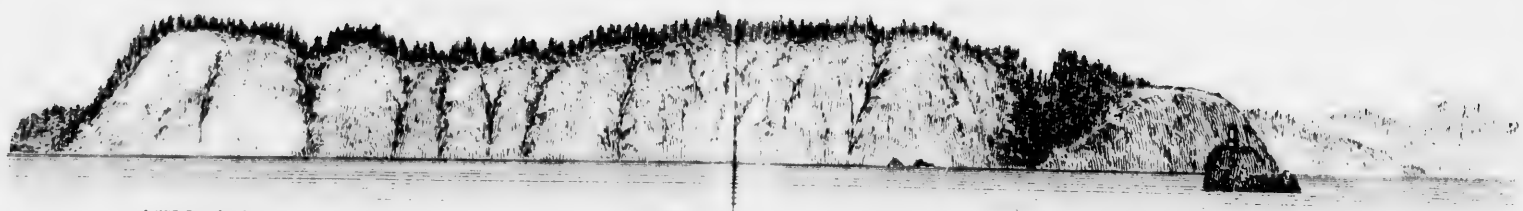


1,280 feet high.

Tillamook Head

Tillamook Rock.
Light-house, E. ¼ N., 3 miles.

the one inside the low-water line is thirty-nine feet high. It lies half a mile south two-thirds east (S. $\frac{2}{3}$ E.) from the highest part of Arch Cape.

Hug Cape.—A small jutting cliff projects to the edge of the low-water beach line one and three-quarters miles northward from Arch Cape, and four miles north three-quarters west (N. $\frac{3}{4}$ W.) from Cape Falcon. The adjacent cliffs reach one hundred and eighty feet elevation, and are forest-covered to the edge. The three-fathom curve lies three-eighths of a mile from the point. Two or three small rocks lie just south of it inside the low-water line.

It was so named because travelers are compelled to keep close to it in passing by.

Midway Cliff.—Exactly half-way between Cape Falcon and Tillamook Head a secondary ridge comes from the eastward with an elevation of ten hundred and fifty feet at a little less than two-thirds of a mile from the shore. It is heavily wooded and pitches sharply towards the sea, ending in a broken, rocky cliff one hundred feet high and four hundred yards long, and further marked by two rocks just outside of the low-water line. The one abreast the north end of the cliff is forty yards in extent and seventy-six feet high; and the one abreast the south end is one hundred and twenty-five yards in extent and one hundred and seven feet high. The cliff bears north thirteen degrees west (N. 13° W.), distant five and one-third miles from Cape Falcon, and south forty-seven degrees east (S. 47° E.), exactly the same distance from Tillamook Rock Light.

Off this cliff the three-fathom line lies out over three-eighths of a mile. A *sunken reef*, with two points bare at low water, lies on the ten fathom line almost one mile west by south three-quarters south (W. by S. $\frac{3}{4}$ S.) from the highest part of the cliff, and west by south (W. by S.) from the higher of the two rocks.

Just outside of this ledge the depth of water is fifteen fathoms. At one and five-eighths miles from the cliff the depth of water is twenty fathoms over fine dark gray sand, and a depth of sixty fathoms is found ten miles from shore, over a bottom of fine gray sand and mud.

From Midway Cliff the shore continues in a straight line north-northwest for two and two-thirds miles to the mouth of Ecola Creek; thence it turns sharply to northwest half west for the same distance to the westernmost point of Tillamook Head. The details of this part of the coast are given under Tillamook Head.

TILLAMOOK HEAD.

This is one of the most notable and prominent headlands upon the coast. Northward of it there is no headland of equal height until we reach the Strait of Fuca. To Cape Grenville, eighty-two miles distant, the shore-line is low and sandy, except the comparatively low heads of Cape Disappointment. This head is a good landmark for making the mouth of the Columbia River when the great landfalls of Saddle Mountain and the mountains behind Cape Falcon are in clouds. Before being up with the Head the moderately high land of Cape Disappointment is made as two low, rounding islands, in clear weather.

When the Head bears about north by west the summit shows very nearly horizontal and is covered with heavy fir forests. There is a slight decrease of height behind it, while farther east and southeast the mountains are very high and broken. At four miles east-northeast from the Head there is a mountain seventeen hundred feet in elevation, with a ridge half a mile in extent stretching to the north-northwest from it.

As seen from the westward the summit appears very nearly level, with a marked depression near the southern part, and a fern-covered shoulder rising from five hundred to eight hundred feet; towards the north end, which breaks down more abruptly, there is a little irregularity in the crest-line. When the Head is passed the country behind it is seen to be broken down, and two well separated and wooded peaks are noted; they are probably ten miles distant from the shore to the northeastward of the Head.

From any direction the face of the Head is remarkably forbidding, rocky, high, and precipitous. One mile to the northward of the westernmost point the height is twelve hundred feet at two hundred and sixty yards inside of the foot of the cliff. Along the edge of the precipices the fir trees and the dense undergrowth render travel almost impracticable, but there is a trail across it one mile inland. Only one open fern-covered space exists and that is a small one on the southern face.

When the weather is dark and stormy the whole face of this headland appears black and without any relief. When the sun is shining upon it it is moderately light. When off this vicinity in thick hazy weather, with fog lying close along the shore and rendering Cape Falcon

and Tillamook Head invisible, Saddle Mountain may frequently be seen above the fog and haze and therefore used as a landfall. It is described on page 449.

The shore approaches to Tillamook Head from Midway Cliff (five and a third miles to the southward), are moderately high and wooded, and run straight north-northwest to the mouth of *Elk* or *Ecola Creek*,* with a broad low-water beach. At one and a half miles from Midway Cliff there is a cluster of rocks covering an area of four hundred yards, and stretching out from the low-water line to ten fathoms. The largest is two hundred and fifty yards in extent and two hundred and thirty-five feet high, which is higher than the adjacent, slightly broken shore. Two smaller rocks on the south side of the large one are ninety three and seventy eight feet high. At two and a half miles from Midway Cliff the Ecola Creek enters, with a broad, retreating mouth, low cliffs and land on the south shore, and higher broken cliffs on the north shore. There is a line of sand dunes on each side of the stream which are about half a mile in length, north and south, and form a feature in the views of the Head as seen from the southward. A short distance inside the shore-line this stream is only twenty yards wide, it comes through a sharp, deep valley, densely wooded, and the break through the immediate coast hills is quite marked.

Half a mile to the northward is *Four-rock Cliff*, which is a small, fern-covered projection, one hundred feet high and rising to one hundred and eighty feet before the firs are reached. Stretching out three hundred and fifty yards from this cliff are four black rocks, sixty-five, seventy-nine, fifty-six, and ninety feet high, clustered close together. These mark the northern extremity of the broad low-water sand beach from Cape Falcon; but on the north side of Four-rock Cliff there is a stretch of five hundred yards with a narrow, low water sand beach under the cliffs. Four-rock Cliff is eight and three-quarters miles north eighteen degrees west (N. 18° W.) from Cape Falcon, and two and four-fifths miles south seventy-one degrees east (S. 71° E.) from Tillamook Rock Light.

Thence to the Head the irregular shore-line is composed of wild, jagged precipices, guarded for a mile beyond Four-rock Cliff by many small and some large rocks, which stretch over half a mile from shore. The outermost rock of this dangerous locality is an *Arch Rock*, one hundred and four-five yards in extent and one hundred and forty feet high, with smaller ones near it, and a forty-feet rock two hundred and sixty yards inside. This Arch Rock lies one and five-sixths miles south seventy-one degrees east (S. 71° E.) from Tillamook Rock Light. It lies just outside of the three-fathom line, and has four fathoms of water a short distance north of it, and ten fathoms a quarter of a mile outside of it.

This rock lies off a small, rocky point without cliffs on the south slope, which is partly broken and partly fern-covered with straggling firs. Back of this, two hundred and forty feet above the sea, is a small clearing and farm-house (not visible from seaward), which was the only human habitation met with after leaving the south slope of Neah-kah'-nie Mountain during the time of the topographical survey in 1875. The coast trail from Tillamook Bay to the Columbia River passes close by this house. On a very short stretch of beach just under this point a boat once landed from a disabled steamer off the coast, and the crew made their way to Astoria for assistance. The boat still remained there.

Thence to the southern, slightly jutting point of this Head the distance is one and one-quarter miles northwest by north. The top of the bare cliffs at the south point is five hundred and six feet above the sea. The north point is half a mile north by west two-thirds west from the south point, and there the broken cliffs on the north side reach almost one thousand feet at the four-fathom line. There are some small rocks, and one or two sunken rocks close under the south point, but the three-fathom curve, which embraces them, is not more than two hundred and fifty yards from the base of the cliffs. At the north point there is a pinnacle rock at the very foot of the cliffs, and just outside this is a close cluster of three high rocks, without any passage between them, or between them and the cliffs. The outermost rock is the smallest and lowest, and is three hundred yards from the point; it is forty-five feet high. The second is larger and is one hundred and twenty feet high. The third and innermost one is one hundred yards in extent and one hundred and fifty feet high.

The cluster lies outside the three-fathom curve, and a depth of four and a half fathoms of water is found close under the outer rock, and ten fathoms of water within three hundred and fifty yards.

To the northward of the extreme western point of Tillamook Head the line of the cliffs recedes to the northeast by north for one mile, then with a general rounding curve to the north

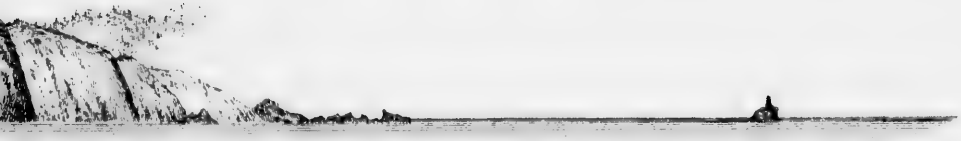
* Named Ecola or Whale Creek by Lewis and Clarke in 1805.

Tillamook Rock Light-house (as seen from the northwestward). Fog-siren.

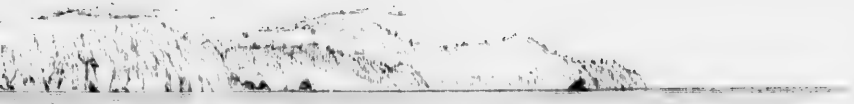
Tillamook Head.

Tillamook Head.

Tillamook Rock Light-house (as seen from the westward).

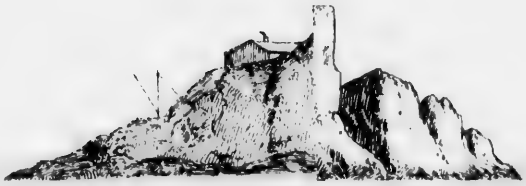


Farther land in clouds. Tillamook Rock Light-house, SE., 6 miles.

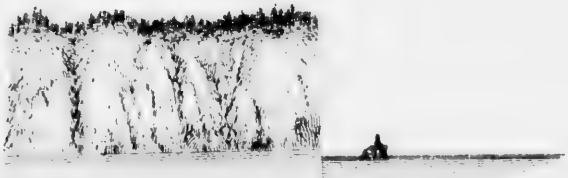


Ne-ah-kah-nie Mountain, 1,600 feet. Cape Falcon.

Tillamook Rock Light-house, SE. by S., 7 miles.



Tillamook Rock Light-house (as seen fro[illegible]rom the westward).



Tillamook He[illegible]ight-house, SE., 6 miles.

S., 7 miles.

for about three-quarters of a mile it changes its wild, precipitous front, sinks in height, and trends to the east-northeast for a mile and a half to low land covered with forest and bordered by sand beach. The highest part of the Head is at the large turn, one and two-thirds miles northward from the extreme western point, where it reaches twelve hundred and eighty feet elevation, falling down somewhat behind it. There are no outlying rocks or dangers farther than two hundred and twenty yards from the cliffs, where two sunken rocks are found under the highest part of the Head. The three-fathom line is close under the rocky foot of the cliffs, and at one-quarter of a mile the general depth is six to seven fathoms.

The northern limit of the high ridge of Tillamook Head lies a trifle over one and a half miles north twenty-four degrees east (N. 24° E.) from the Pinnacle Rock at the extreme western point, and two and four-fifths miles north thirty-one and a half degrees east (N. 31½° E.) from Tillamook Rock Light-house. Its geographical position is:

Latitude	45°	57′	49″.4 north.
Longitude	123°	58′	03″.0 west.
Or, in time	8h	15m	52s.2

In January, 1885, the magnetic variation was 21° 35′ east, with a yearly increase of 2′.2.

From the extreme western point of the cape, in latitude 45° 56′ 43″.1, longitude 123° 59′ 39″.4, the western point of Cape Falcon bears south twenty-five degrees east (S. 25° E.), distant ten and five-sixths miles; and the Light-house on Cape Disappointment north twenty-nine degrees west (N. 29° W.), distant nineteen and one-seventh miles.

The highest point of the trees of Tillamook Head should be visible from seaward at a distance of forty miles; they are tangent to the horizon at forty-four miles.

THE TILLAMOOK ROCK LIGHT-HOUSE.

This sea-coast light is one of the most important upon the northern coast because it marks the approach to the Columbia River. The Light-house is built upon the Tillamook Rock, one hundred and seventy-five yards in extent and (formerly) one hundred and fifteen feet high, with a subordinate summit to the south-southeast. It is a bold, basaltic mass lying one and one-fifth miles south forty-one degrees west (S. 41° W.) from the Pinnacle Rock at the western extremity of Tillamook Head. As it rises from the ocean the face of the rock on the west side is precipitous for fifteen feet, then breaks back with an irregular slope for a short distance, and then rising to eighty feet it leans over to seaward. The large rounded knob above this has been blasted away to make a flat surface for the buildings about ninety feet above the sea. The north side is nearly vertical. The east side slopes gradually to the sea under an angle of one-fifth. There is a deep fissure on the south side separating the secondary summit.

The water on the west, north, and east sides of the rock is from twenty-five to forty fathoms deep, but shoals to sixteen and eighteen fathoms are on the south side over a limited area. The sides of the rock are so steep that it is reported by the Light-house keepers that whales are frequently seen rubbing their barnacles off against the rock. Before operations were commenced here the rock was the resort of thousands of sea-lions.

A very interesting account of the building of the Light-house has been published by the Government. The work occupied nearly two years.

The light is a primary sea-coast light of the first order of the system of Fresnel.

The structure consists of a stone building about forty-six feet square, and eighteen feet high to the top of the slightly sloping roof. This building faces east with a large door and two windows; the north and south sides have two windows each. A stone tower sixteen feet square rises six feet above the roof of this building to the iron balustrade, above which brick walls are carried eight feet farther to the base of the lantern. Each side of the tower has one window. Above the tower is the lantern with a round dome. There is a one-story stone fog-signal building about thirty feet square of the same height as the main building attached to the west side thereof. All these structures are painted white, except the lantern and dome which are painted black. On the east side, on a lower level, is a small brick building containing the hoisting engine, and a derrick for landing supplies.

The light was first exhibited January 21, 1881. It shows from sunset to sunrise a *flashing white light every five seconds.* The length of the flash is about two and a half seconds, and of the dark interval two and a half seconds.

When passing close to the Rock in October, 1885, we timed the light as follows: The very bright flash one and a half seconds; the total eclipse three seconds; but there was a secondary

brightness of half a second's duration preceding the brilliant flash. This secondary bri[illegible] could not be seen when several miles distant. The light is seen around the entire horizon; [illegible] range of visibility upon safe water is between the bearings southeast by south half south (SE. by S. ½ S.) round by the south and west to north by west one-quarter west (N. by W. ¼ W.).

The base of the building is eighty-eight feet above the mean level of the sea, and the [illegible] of the focal plane is one hundred and thirty-six feet above the sea. Under favorable co[illegible] of the atmosphere the light should be seen from a height of—

10 feet at a distance of 16.9 miles.
20 feet at a distance of 18.4 miles.
30 feet at a distance of 19.6 miles.
60 feet at a distance of 22.2 miles.

A ship passing on the direct course from Cape Flattery to Cape Orford, laid to pass [illegible] the dangers of Flattery Rocks and the Orford Reef, will pass about eight or ten miles outside of the visibility of this light at a height of sixty feet.

When this light was established the flashing red light at Point Adams was changed to a fixed red light.

The geographical position of Tillamook Rock Light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	45°	56′	14″.0 north.
Longitude	124	01	11 .4 west.
Or, in time	8h	16m	04s.8.

The magnetic variation in January, 1885, was 21° 35′ east, with a yearly increase of 2′.2.

During southeast storms the great swell of the Pacific from the southwest rolls with tremendous force upon this rocky islet, and owing to the open gorge on that side the waters are driven over with great fury; large pieces of rock have been cast upon the roof of the dwelling, one hundred and fifteen feet above the sea. It is reported that in the great storm of 1882 the waves were swept over the top of the Light-house.

FOG-SIGNAL AT TILLAMOOK ROCK LIGHT.

This is a *first class steam siren* which gives blasts of *five seconds duration* at *intervals of [illegible] and a half minutes*, in thick and foggy weather.

The number of hours during which the fog-signal is sounded per month exhibits the relative amount of foggy weather. In general the months of August and September have the least periods of fog. The following are the number of hours for each month during 1886: Jan[illegible] twenty-four hours; February, twenty-six hours; March, thirty-nine and a half hours; A[illegible] three and two-thirds hours; May, nine and three-quarters hours; June, [illegible]irteen hours; J[illegible] fourteen and a half hours; August, one hundred and thirty-three and [illegible]ree-quarters h[illegible]s. September, ninety-four hours; October, forty and a quarter hours; November, twenty-one [illegible] three-quarters hours; and December, forty-three hours.

It is to be noted, however, that there is probably less fog at Tillamook Rock than [illegible] entrance to the Columbia River, as the following extract from the journal of the Superinten[illegible] of construction of the Light house, under date of March 22, 1880, will show:

> It has been observed since coming here in October [1879] that there has not been a dense fog on the r[illegible] that it is generally clear to westward when there is a dense fog hanging over Tillamook Head and Colum[illegible] or that when the main-land can not be descried at all, it is generally clear for several miles to the westward.

Under date of April 28, same year, this experience is confirmed.

Danger.—There is a *rock awash* inside of Tillamook Rock and one-third the distance from the Light to the nearest part of Tillamook Head. It is about thirty yards in extent and bears north sixty-seven degrees east (N. 67° E.), distant seven hundred and forty yards from the L[illegible] Although there is a depth of fifteen fathoms of water near each rock and between them, and [illegible] between the danger and the Head, yet no strangers should attempt the passage except in a great emergency, because the currents are strong and variable. Vessels bound for the Columbia R[illegible] from the southward can safely pass within less than a mile outside of the Light-house in thirty fathoms of water. The coast should not be approached nearer than on a course to the Rock [illegible] north by west one-quarter west (N. by W. ¼ W.). After passing the Rock a vessel should [illegible] pass to the eastward of the line joining it with Cape Disappointment Light-house. A course northwest by north (NW. by N.) from the Rock will lead to the Whistling Buoy off the Columbia River bar (1887), distant thirteen and a half miles.

Tillamook Rock Buoy.—This is a *sixty-feet spar buoy, painted white*, lying in twenty-three fathoms of water two hundred and fifty yards northwest by north (NW. by N.) from the Light-house on Tillamook Rock. It is used as a mooring-buoy for the Light-house tender when supplying the station.

From Tillamook Rock Light-house we have the following bearings and distances to prominent objects:

Fox Rock, of the Orford Reef	S. 13½°	E.	191 miles.
Cape Orford Light-house	S. 14°	E.	187 miles.
Cape Gregory Light-house	S. 16°	E.	156½ miles.
Yaquina Heads Light-house	S. 19°	E.	75 miles.
Cape Lookout	S. 23½°	E.	35½ miles.
Cape Meares, marked by the Three Arch Rocks	S. 26°	E.	26 miles.
Cape Falcon	S. 30°	E.	10½ miles.
Point Adams Light-house	N. 16°	W.	15½ miles.
Cape Disappointment Light-house	N. 24½°	W.	21 miles.
Cape Shoalwater Light (not intervisible)	N. 24°	W.	47 miles.
Destruction Island, proposed Light-house	N. 31½°	W.	105 miles.
Tatoosh Island Light-house (not intervisible)	N. 32°	W.	151 miles.

Hydrography off Tillamook Rock.—One mile off the Light-house the depth of water is thirty-three fathoms over a bottom of fine dark-gray sand; forty fathoms at two miles over similar bottom; forty-five fathoms at four miles, similar bottom; fifty-five fathoms at eight miles, with both green mud and sand; and at ten miles sixty-one fathoms, similar bottom.

In August, 1775, Don Bruno de Heceta discovered the mouth of a great Bay, which was really the mouth of the Columbia River, and this remarkable Head he named Cape Frondoso. Heretofore this name has been supposed to belong to Point Adams, but a study of his narrative satisfies the present conclusion. (See note to Columbia River.)

Cook, Meares, and Vancouver do not mention it, although the last has it weakly represented on his chart. In latitude 45° 55′ La Pérouse speaks of a cape formed by a wood-topped mountain as the Cape Redondo of the Spaniards. Clarke, of Lewis and Clarke, designates it on their chart as "Clarke's Point of View," and the detailed description unmistakably applies to this Head. He says that the top of the mountain is twelve hundred feet elevation; and immediataly below the summit, in this face of the precipice, there is a stratum of white earth. The highest point of the mountain is an open spot facing the ocean. When making the descent he found in many places the hill-sides very steep and dangerous; they were formed principally of yellow clay which had been washed by the rains and were slipping into the sea in large masses of fifty and one hundred acres. Near his Point of View he found a very thick growth of pine and fir; some of the trees, which were perfectly sound and solid, rose to a height of two hundred and ten feet, and were from eight to ten feet in diameter.

On some old maps this Head is erroneously called Cape Lookout. Upon one we find it called Cape Mezari, and upon another Cape Misaria. De Mofras calls it the Cap N. S. de la Luz. The United States Exploring Expedition of 1841 calls it Killamuke Head. Tebenkoff very faintly copies Vancouver and has no name. The Coast Survey reconnaissance chart of 1850 calls it Killamuck Head. In 1851 when we were occupying Cape Disappointment it was known as Tillamook Head and that name has continued.

The *Landfall* of this region is *Saddle Mountain*, which from the southwest shows as a double-peaked mountain with the easterly summit the lower one. The slopes of either peak to the apparent south and apparent north are nearly the same. When off Cape Disappointment, and McKenzie's Head of that Cape is on with Point Adams, Saddle Mountain is in line with them, and then two subordinate peaks show out between the two main ones, and the higher peak begins to come more to the front. After entering the river, and when to the eastward of Tongue Point, the whole profile of the mountain is changed, and it would hardly be recognized, but the higher peak is to the westward, and the western face of the mountain shows a sheer precipice of four hundred feet. The summit area of this higher peak is very limited in extent, and it has no trees, but it is well wooded on its slopes nearly to the top. The lower peak is similarly a bare summit with trees on the slopes. The two tops are about half a mile apart.

When south of Tillamook Head the mountain shows over the low country behind Elk or Ecola Creek and the higher wooded ridge some miles back; and it is a marked object when a vessel is north of Tillamook Head, and hence to the bearing of Mount St. Helens over Point Adams when the first of the two intermediate peaks show slightly on the left flank of the higher peak.

The height of Saddle Mountain is thirty-three hundred feet, and it should be visible at a dis-

tance of sixty-five miles, or fifty miles from the coast. The geographical position of the western peak, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude..... 45° 58′ 01″.0 north.
Longitude..... 123° 41′ 11″.1 west.

It lies north twenty four and a half degrees east (N. 24½° E.) seventeen and a half miles from Cape Falcon; north sixty and a half degrees east (N. 60½° E.) fourteen and one-sixth miles from Tillamook Rock Light-house; and south sixty-one and a half degrees east (S. 61½° E.) twenty-four miles from Cape Disappointment Light-house.

Vancouver has a view of this landfall on his chart, but he does not refer to it in his narrative. We found the name in use among navigators in 1851, and in 1853 we located it approximately for the reconnaissance chart.

Coast features.—It will be noticed that in the descriptions of the coast from Cape Orford to Tillamook Head the land representing the Coast Range mountains is much broken up by transverse valleys as far north as Yaquina River; and that there are a few high and well recognized peaks known to the navigators, but whose positions are not yet established. These peaks average between twenty and twenty-five miles from the shore-line. North of the Yaquina River the Coast Range is more compact and continuous, but its crest-line is very irregular; at some places it comes close to the sea board, and at other places retires well inland. Saddle Mountain represents the highest peak in the region of the Columbia River.

The immediate sea-board is nearly straight, and marked by long lines of high sand dunes between the beach and the forests. Along the straight shores the transverse spurs of the Coast range press over the water and form the numerous Heads and Capes, which are conspicuous only because the land on the south and north of them is comparatively low. No great rivers open upon the ocean, although several are moderately large and their mouths afford fair harbors.

There is one peculiarity of this long stretch of sea-coast; that the winds of the great storms of winter do not make it a lee shore, but blow very nearly parallel with it, and so far as we can gather there has been no case where a vessel has actually been driven ashore from stress of weather. In the summer northwest winds, although they draw over the land, it never blows so squarely and so violently on shore as to make a dangerous lee shore.

The great depth of water that is found within a mile of the shore, the absence of dangers as much as a mile from the general shore-line, except Tillamook Rock (upon which there is a Light-house and fog-signal), and the very slight curvature to the eastward, conspire to make it a coast where no well-found vessel can be lost with reasonable care and precaution.

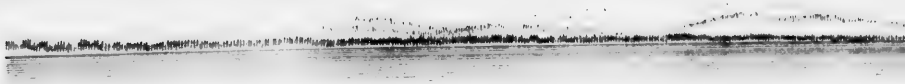
The Davidson Inshore Eddy Current.—When the Tillamook Rock Light-house was being built part of the stones for the building were carried off the rock in heavy storms. Some of the barrels were found cast ashore as far northward as the Quéniualt River, a distance of eighty-five miles.

Northward of Tillamook Head.—At two and a third miles east, and one and three-quarters miles north of the westernmost point of Tillamook Head, where the high land drops suddenly to low land, there begins a broad sand beach which runs fourteen miles north thirty degrees west (N. 30° W.) to Point Adams, the south point of the entrance to the Columbia River. The beach makes a long regular curve, one mile deep to the eastward. A peculiar feature of the topography is that two or more long lines of low sandy ridges run parallel with the beach towards Point Adams. They appear like great sand waves covered with grass, fern, and bushes, for half a mile inland, and are known as the Clatsop Plains. Between them run small, sluggish streams, and the country behind is low, swampy, and covered with forest and an almost impenetrable undergrowth. A mile or two inland the low, wooded hills are reached, but these decrease in height as Point Adams is approached.

In the indentation northward of Tillamook Head are several large white buildings erected for summer resorts, and a tall flag-staff is standing just at the edge of high water. Beyond these houses, at two and a half miles northward of the bend in the shore, there is the broad entrance to a stream with three arms, two from the south and one from the north. It is called the Nekanakum Creek, the main southern stream of which is nearly one hundred yards wide. Clarke, 1805–'6, says it was eighty yards wide and a swift flowing creek. On their chart it is called the Clatson River. The mouth is quite wide between high water marks, and the south side of the entrance is a sandy point three-quarters of a mile long and one-quarter of a mile broad. The north side has a shorter sandy point.

From the mouth of this creek to the northward the high-water line is marked by a low, sandy bluff, with parallel lines of sand ridges covered with grass.

Land-fall to the Northward
Cape Disappointment Light



Land-fall to the Northward of the Columbia River. East ¼ N.
Cape Disappointment Light, bearing East 34 miles.

North Head
Cape Disappointment, SE. by S., 9¼ miles

Cape Disappointment, SE by S 12¼ miles.

East ¼ N.

North B

Cape Disappointment, SE. by S.

Cape Disappointment, SE.

Rocks off Tillamook Head, South.

Saddle Mountain,
E. ¼ N., 52 miles.

Tillamook Head, E., 41 miles

Land-fall South of the C

Light-house, E. ¼ N., 6 miles

Coxcomb Hill.

The Clatsop Beach.

The approaches to the Columbia R

amook Head, South.

Tillamook Rock Light-house,
SE. by S. ¼ S., 2¾ miles.

Mountain behind Cape Falcon, E. ¾ S., 51 miles

Land-fall South of the Columbia River.

Green Mountain.

Saddle Mountain
3,300 feet

he approaches to the Columbia River from the South (3 sketches).

Saddle Mountain. ain behind Cape Falcon, E. ¾ S., 51 miles
E. ¼ N., 52 miles.

Light-house E. ¼ N., 6 miles
Coxcomb Hi

Scarborough Hill.

Point Gilbert

Towards Shoalwater Bay.

North Head.

McKenzie's Head.

Cape Disappointment
N. by E. ½ E.

North Head.

Light-house, N. by W. ½ W

Cape Disappointment

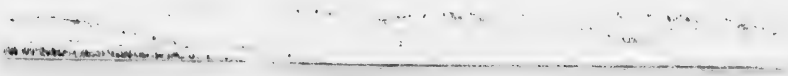
Approaching Columbia River from

Point Ellice. Jim Crow Point. Mount St. Helens.
Tongue Point. Point Adams

Cape Disappointment Light-house,
N. by E. ¾ E., 4 miles. Chinook River. Sand Island Beacon.

pproaching Columbia River from the Southward. Scarborough Hill.
Point Adams Light-house, N. ¾ E., 7½ miles

Buoys. Second buoy. Cape Disappointment. Light-house. 287 f
North Head, N. 17° W. from Whistling Buoy.



Clatsop Beach. View of Entrance to Columbia River

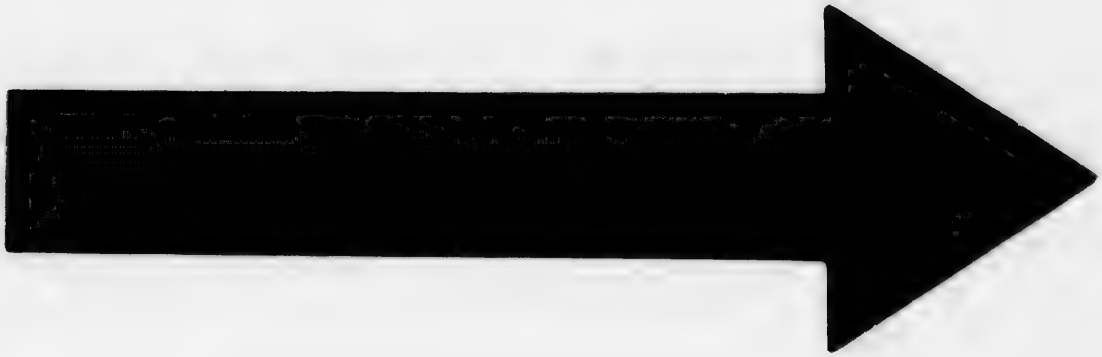
Cape Disappointment

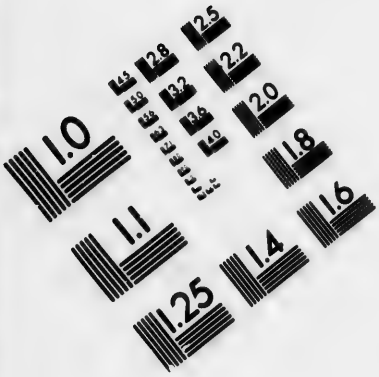
Light-house. 287 feet.

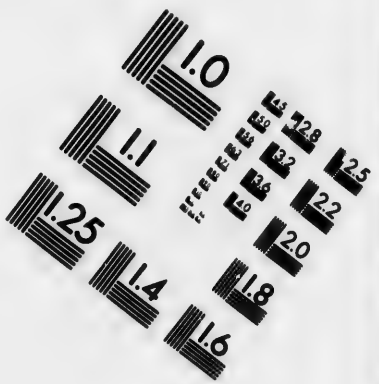
of Entrance to Columbia River from Northwest (2 views). Tillamook Head. Cape Falcon.

Cape Disappointment. North Head, 3 miles. Saddle Mountain, 3,300 feet.

McKenzie's Head. Point Adams Light-house SE. by E. ¼ E., 1 miles







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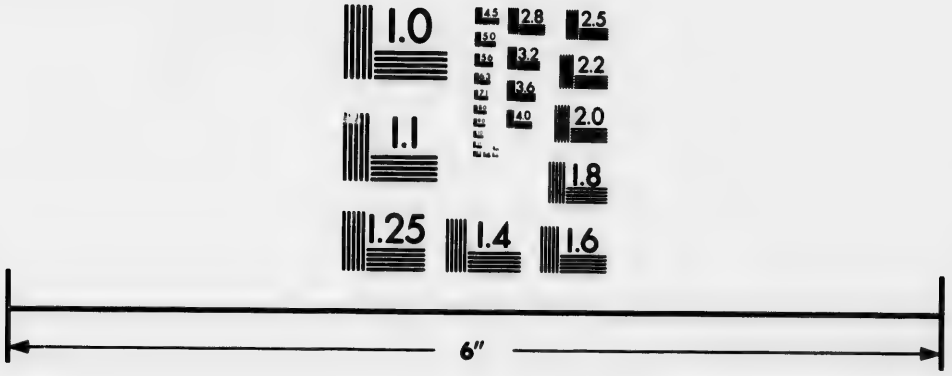

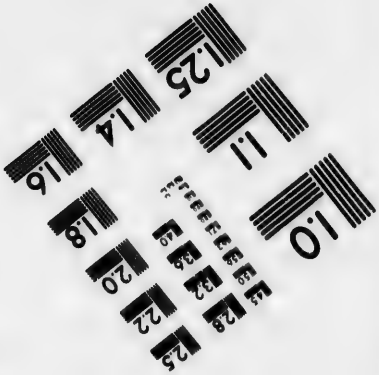

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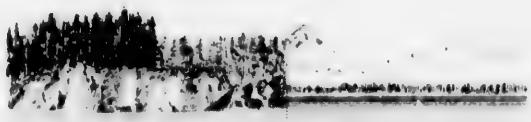
Buoys. Second bu
North Head, N. 17° W. from Wheeling

Cape Falcon.



ntain, 3,300 feet.

Point Adams Light-house,
SE. by E. ¼ E., 11 miles.

THE COLUMBIA RIVER.

OREGON AND WASHINGTON.

The Columbia River in its lower course is the boundary between Oregon, on the south, and Washington Territory on the north. The boundary line leaves the river where it is crossed by the forty-sixth parallel of latitude, near the 119° meridian. It was the southern boundary of Vancouver's "New Georgia" of 1792.

The approaches to the river are fairly well marked, but not upon the scale of the entrance to the Bay of San Francisco or the Strait of Fuca. Coming from the southward the great cape called Tillamook Head is a capital landmark. Saddle Mountain, farther inland, is a landfall as already described; it is visible over forty-five miles outside the bar. When a vessel is thirty-five miles to the west of the river the moderately high mountains which lie to the northward of the river, and several miles northeastward from Cape Disappointment, are visible in fair weather. In clear weather one of the beautiful landfalls, although distant seventy-six miles from the mouth, is Mount St. Helens, which is seen directly up the narrow valley of the river. It is nine thousand nine hundred and ninety-four feet in height, and lies in latitude 46° 11′ 48″.3 north, longitude 122° 11′ 32″.5 west.

The immediate landfall of the entrance is the body of comparatively low hillocks which form Cape Disappointment at the north side of the entrance to the river. The cape is visible from the horizon at twenty miles, and therefore is made out from a vessel's deck at that distance.

The Columbia is the great river of the northwest coast of North America, south of the Peninsula of Alaska. It rises in the Rocky Mountains, very near the headwaters of the Missouri River and the Colorado River; and through several great tributaries it drains an immense area of country, alone capable of sustaining a nation. Through five degrees of longitude its general course to the ocean is very nearly west (true), just under latitude 46°. The river breaks through the Cascade Range of Mountains in longitude 121° 40′. In longitude 122° 40′, where it receives the waters of the Willamette from the southward, it makes a sharp bend northward for about twenty-four miles to the mouth of the Cowlitz, a small stream which comes in from the northward near Puget Sound. Then it continues nearly west, and opens into the Pacific in latitude 46° 13′.

The lower part of this river does not run through a great valley in the same sense that the lower Mississippi does, but through a cañon averaging five miles in width between the high, basaltic cliffs on each side. The river does not occupy all this breadth, but an average of three or four-fifths of the breadth is taken up by low lands, marshes, and shoals. The average width of the stream below the Cascades is one mile.

The lower reaches of the river are much wider, and the stream then actually takes more the character of an estuary for at least twenty-five miles above the mouth. And for thirty-five miles from the entrance the broadened river is taken up largely with low marshes and wooded islets.

Between Three Tree Point on the right bank and Cathlamet Point on the left bank the basaltic walls approach within three miles of each other, and thence outward the channels change their directions and depths, and the low islets are only just acquiring their bushes and trees. The river reaches the ocean between low headlands, of which the southern one is inconspicuous and the northern one is notable but not very high.

The river is navigable for large ships as far as the Cascades, one hundred and twenty-three miles from its mouth; and up to Portland, on the Willamette, ninety-three miles from the mouth. Beyond the head of ocean-ship navigation the river and its great tributaries are navigated by large and swift steam-boats, and it has along many miles of its course one of the transcontinental

lines of railroad. The navigation is not always continuous, on account of obstructions, but the aggregate length must amount to almost eight hundred statute miles. The country drained by the Columbia and its tributaries is an exceedingly rich agricultural and stock-raising region, and is fast filling up with an energetic population.

After these general introductory remarks we take up the details of description.

POINT ADAMS.

The southern Point of the Entrance to the Columbia River is Point Adams. It is a low, sandy point, covered with fir and undergrowth to the edge of the sand beach and low dune. The forest is dense and the trees high so that the point has an appearance of height and is soon clearly readily made out, especially if the atmosphere is hazy inside.

The point remained with very little change from Broughton's survey, of 1792, to 1850, as is indicated by a comparison of the shore-lines, and also by the existence of trees of large growth out to the edge of the point. Since the latter date the point was cut away by the river very rapidly for a few years, and the great trees were undermined and fell into the water. This line of destruction changed some of the details of character of the point; but the cutting stopped, and accretion has been going on to a considerable extent, leaving, however, the extremity of the point denuded.

The point is used as a range-mark by the pilots who keep knowledge of the changes of the bar and channel, and choose their ranges to suit the variable circumstances.

Stretching out from Point Adams is the great shoal known as the Clatsop Spit, whose normal direction points towards Cape Disappointment. It frequently stretches more than half way across the mouth of the river, and is then usually marked by the breakers around its whole extent, except in exceedingly smooth weather and at high water. But there have been periods when its northern edge stretched straight out to sea, and then swept in far to the southward of Point Adams.

The shortest distance from Point Adams to Cape Disappointment is a little over five miles, and the bearing northwest by west (NW. by W.). The distance from Point Adams Light-house to Cape Disappointment Light-house is five and seven-eighths miles, and the bearing north five degrees west (N. 5° W.).

On the inner side of Point Adams is an earth fortification known as *Fort Stevens*. In 1877 the river had cut away much of the old shore outside of it, but subsequent changes of the channel led to redeposits; and now a small stone jetty is being carried out to give protection against further encroachment, to aid deposits, and to direct the course of the river under the south shore. There is a *stake white light* placed at the end of this jetty which is now (1887) surrounded by sand. The characteristics of the Stake Lights are given in the annual Light-house lists.

The geographical position of the flag-staff of Fort Stevens, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	46° 12′ 20″.6 north.
Longitude	123° 57′ 48″.3 west.
Or, in time	8h 15m 51s.2.

THE LIGHT-HOUSE ON POINT ADAMS.

This is a primary Sea-coast Light. The Light-house is not on the northern extremity of the point, but on the outer one of the low sand ridges which run parallel with the ocean shore line. It is almost one mile south of the point and two hundred and eighty-five yards inside the high water mark. The structure is a low, square tower rising from the keeper's dwelling. The buildings are painted white, the lantern and dome black. The buildings show against the dark back-ground of the high fir forest, which is about three hundred yards inside.

The Light is of the fourth order of the system of Fresnel; it was first exhibited in 1875, and shows from sunset to sunrise a *fixed red light*.

The present characteristic of the light was given to it on January 21, 1881, when the Tillamook Rock Light was first exhibited. Previous to that date it was a flashing red light. The light shows round the entire horizon, but the compass range useful to mariners is from southeast by south (SE. by S.), through the south and west to north by west half west (N. by W. ½ W.), where it is cut off by the trees nearer the extremity of the point.

The base of the tower is fifty feet above the mean level of the sea; and the focal plane is

ninety-nine feet above the sea, so that in favorable conditions of the atmosphere the light should be visible from a height of fifteen feet at a distance of about eleven or twelve miles.

The geographical position of the Light, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	46° 11′ 32″ north.
Longitude	123° 58′ 37″ west.

In January, 1885, the magnetic variation was 21° 42′ east, with a yearly increase of 2′.2.

From Point Adams we have the following bearings and distances to important objects:

Cape Orford Light-house	S. 15° E.	203 miles.
Cape Gregory Light-house	S. 17° E.	174 miles.
Yaquina Heads Light-house	S. 20° E.	91 miles.
Tillamook Rock Light-house	S. 15° E.	15¼ miles.
Cape Disappointment Light-house	N. 55° W.	5¼ miles.
Whistling Buoy off the Columbia River Bar (1886)	S. 50° W.	4⅞ miles.

The *steam fog-whistle* at Point Adams was discontinued February 1, 1881, because the sound could not be heard far enough seaward in bad weather on account of the terrific noise of the great breakers.

In summer, during the early part of the evening, dense fogs, which are formed over the waters and low beaches of Gray's Harbor and Shoalwater Bay, are brought southeastward by the summer winds and roll over Cape Disappointment, which they completely shut in before reaching across the river, so that a vessel may make the Light-house on Point Adams when the Cape is invisible.

This point was not named by Heceta. On August 17, 1775, he was off the mouth of the river, which he supposed to be a great bay, but he was so far distant that he noted only the Cape, on the north, and Tillamook Head on the south. (See note to Columbia River.) It was not distinguished by Cook or by Meares. It was called "Adams' Point" by Gray in 1792; and later in the same year Vancouver named it Point Adams. Lewis and Clarke, 1805–'6, speak of it in their narrative as Point Adams, but on the chart of the entrance to the river it is called Point Round, and on their general chart P. Ronde, the name applied to it by La Pérouse. The name Point Adams was retained by the United States Exploring Expedition in 1841, and it is never known by any other. De Mofras calls it C. Frondoso on Pte. Adams. The Indian name of the point is Klaát-sop.

The beach around Point Adams and to the southward for some indefinite distance is locally known as the Clatsop Beach. Upon the southern part of it, many years ago, before the white people occupied the country, a Chinese or a Japanese junk, with many hands and a cargo of beeswax, was cast ashore and went to pieces; the crew are reported to have been saved and taken into slavery. In support of this Indian tradition of the wreck there are occasionally after great storms pieces of this wax cast ashore coated with sand and bleached nearly white, although the interior is yellowish. Formerly a great deal was found, but now it is rarely met with. Belcher mentions having a specimen, and we have several in our possession. In Perry's Japan this wreck has been confounded with another and well-known wreck that took place near Cape Flattery.

Whether this wreck took place on the Clatsop Beach or farther to the southward is an open question. At the Nehalem River, and midway across the sandy peninsula at its mouth near its junction with the main-land, large and small pieces of wax are often found uncovered after strong winds. Among the settlers in the vicinity there is a tradition, derived from the Indians, that the wreck took place off the beach where this sand spit begins; and they even assert that part of the wreck has been pointed out by the Indians at extreme low tides. The wax found here is black on the surface, but when cut discloses the ordinary color of beeswax.

If the littoral drift is to the northward the wax found on the Clatsop Beach may well have come from the southward.

CAPE DISAPPOINTMENT.

This Cape is the north point of the entrance to the Columbia River, and is the only headland that breaks the low line of sandy shore which stretches from Tillamook Head to Point Grenville, latitude 47° 18′. Immediately behind the beach and the lines of low sand dunes in this long stretch of coast, the forests begin. For a short distance inland the country continues low, or appears low where the great areas of the rivers and bays exist. Irregular mountain-masses, covered with forest, show over the lower coast-line.

South of the Cape the low land from Tillamook Head to Point Adams recedes from the general direction of the coast, and this fact also gives prominence to this headland. Immediately north of it the low land begins and runs hence to Point Grenville, marked by fir forests behind the shore.

The Cape itself presents a geological formation not common on the seaboard. It is composed of very irregular horizontal columnar basalt rising to an extreme elevation of two hundred and eighty-seven feet, but disposed in a succession of huge rounding hills nearly divided into two masses by a narrow valley running north-northwest and south-southeast. These irregular hillocks give a very broken sea front, marked by short strips of sand beach, jagged, rocky points, and detached rocks under the northwestern part. The sea-faces of all the hills and irregularly projecting knobs rise perpendicularly for many feet, then slope upward to the crest-line, when they drop almost as suddenly, thus forming narrow and sharp ridges. These ridges and nearly all the seaward faces are destitute of trees, but are covered with grass, fern, and bushes. The soil is thin but excellent. Inshore of these crest-lines the trees begin, and their tops, reaching above the summits of the hills, increase their apparent height. The inshore slopes of the hills are comparatively gentle, so that paths can be carried to the tops. The total extent of this mass of pudding shaped hills is about two and one-third miles north-northwest and south-southeast by one mile in width. From the extreme southeastern point the general directions of the ocean face is northwest for two miles, and then north-northeast for one and a quarter miles. The ocean-front has several minor heads that are recognized by pilots and navigators.

The Light-house Point is the extreme southeastern part of the Cape. It is nearly half a mile in extent, north-northeast and south-southwest, and two hundred and eighty-seven feet above the sea. It was formerly sparsely covered with trees, but these have been cut away to give the light a free horizon towards the river. The Light-house is situated on the extreme southern, but not on the highest point of this part of the Cape.

McKenzie's Head is the first knob to the northwest, three-quarters of a mile from the Light-house. It is an almost round knob, three hundred and fifty yards in extent and one hundred and ninety feet above the sea, covered with grass and fern on top and has no trees. It is almost surrounded by the sea except for a short distance on the northeast-side where it is connected with the Cape by a low, sandy neck covered with bushes. Towards the Light-house and towards the northwest are two low, broad sand beaches, upon which we have landed through the surf in a canoe.

North Head is the extreme western knob of the Cape. The seaward face is a precipitous rocky cliff behind which is a narrow area of grass-covered surface, and then the firs cover the higher ground which rises to two hundred and seventy feet. This is the part of the Cape which first rises above the horizon and it is about half a mile in extent. The seaward cliffs are very jagged and the base bordered by small rocky masses. This part of the Cape cuts off the arc of visibility of the Light, and there is no doubt that for a sea-coast light the Light-house should have been placed at this point. In its present position it was intended to do duty for the river also.

The extremity of North Head lies north sixty degrees west (N. 60° W.) one and three-quarters miles from the Light-house. Its geographical position is:

Latitude	46° 17′ 55″ north.
Longitude	124° 04′ 48″ west.

It had no name at the date of the United States Exploring Expedition, 1841.

The inner shore of Cape Disappointment, facing Baker's Bay, which is inside the mouth of the river, is broken by jutting rocky points, and, except immediately inside the east point of the Cape, there is no low-water beach.

From the southward, when a vessel is off Tillamook Rock Light house, Cape Disappointment is made as two small, low, round-topped islands, with high, wooded hills far to the northeastward. Approached from the northwestward, at the distance of twelve or fifteen miles, it rises in somewhat the same form, the higher head being to the apparent westward. At ten miles, when bearing southeast, a long, low line of dark forest stretches to the northeast from the Cape towards high wooded hills inland.

From the west and southwest, when the atmosphere is clear, the Cape appears projected upon the high hills and mountains inside of it, but the slightest haze or smoke inside of the Cape brings it out very clearly, and almost makes it appear as an island.

In 1851 we occupied an astronomical station on the highest point of the southeastern part of

the Cape and opened an ox-team road thereto from the beach in Baker's Bay. The evening fogs, from the northern bays and low beaches towards Point Grenville, sweep down over the Cape and cover it immediately after sunset, so that we were at the Cape thirty-five days, in July and August, 1851, before we saw stars or moon. When these fogs do not cover the Cape a dense fog sometimes rolls down the river about sunrise, enveloping everything below the top of the Cape, so that the summit appears like an islet in a sea of mist.

The isolated position of this headland, and the seaward face of its bold, treeless cliffs, form a peculiar feature in the long stretch of low coast to the southward and northward. And as it is basaltic, and presents an almost iron front to river and sea, it is impossible that "in the memory of many Cape Disappointment has been worn away some hundred feet by the sea and strong currents that run by it."* This remark was evidently intended to apply to Point Adams.

THE LIGHT HOUSE ON CAPE DISAPPOINTMENT.

The Light-house is not upon the highest part of the cape, but on the pitch of the spur which runs three hundred and and fifty yards southwest by west therefrom. Here the ground is about ninety-five feet below the summit, and the ridge is narrow and steep towards the sea to the south-southeast, and to the north-northwest on the land side.

The tower is the frustum of a cone forty feet high, painted white, surmounted by an iron balustrade, lantern, and dome, painted black. The keeper's dwelling is not visible from the sea or from the bar. The tower is projected against the dark green trees behind it, and therefore it shows well in sunlight; when it bears north by east half east (N. by E. ½ E.) it shows in a notch of the trees. To the eastward on the higher summit there are two or three trees which in a dark day would look like towers at a distance.

About a hundred yards to the eastward of the Light-house is a small wooden building, painted a dark lead color; it is quite inconspicuous from the water. It is the U. S. Signal Service station, and from a tall mast near it storm signals are displayed to warn mariners of approaching heavy weather.

The Light is *a fixed white light* of the first order of the system of Fresnel; it was first exhibited on the 15th of October, 1856, and shows from sunset to sunrise.

Although the limits of the arc of visibility of the light are from north seventy one degrees east (N. 71° E.) round by the south and west to north nineteen degrees west (N. 19° W.), yet it commands the sea-horizon for about one hundred and forty four degrees only; that is from south east, close to the breakers midway between Point Adams and Tillamook Head, round by the south and west to northwest by west one-quarter west, where it is shut out by the North Head, so that vessels coming from the northward can not see the Light until they are nearly in the latitude of the river.

The base of the tower is one hundred and ninety-two feet above the mean level of the sea, and the focal plane is two hundred and thirty two feet, so that under favorable conditions of the atmosphere the light should be seen from a height of—

10 feet at a distance of 21.0 miles.
20 feet at a distance of 22.5 miles.
30 feet at a distance of 23.7 miles.
60 feet at a distance of 26.3 miles.

The geographical position of the Light, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	46° 16′ 28″.6 north.
Longitude	124° 03′ 11″.3 west.
Or, in time	8h 16m 12s.8.

In January, 1885, the magnetic variation was 21° 47′ east, with a yearly increase of 2′.2.

On the beach in Baker's Bay, just inside of the Cape, there is a great deal of "Black Sand," or magnetic oxide of iron, in fine particles with a few small flakes of gold among it. This black sand caused a local disturbance of the magnetic variation amounting to 26′.2, the variation being less by that amount than the declination we found on the summit of the Cape in 1851; similar results were observed in 1873.

The Fog bell at Cape Disappointment was discontinued September 1, 1881, because it could not be heard when a vessel was approaching the bar.

* United States Exploring Expedition, 1841.

"Lights and Tides of the World," by James Imray & Son, to 1885, does not notice its discontinuance.

From Cape Disappointment Light-house we have the following bearings and distances to important points:

Cape Orford Light-house	S. 16½	E.	208 miles.
Cape Gregory Light-house	S. 18	E.	176½ miles.
Yaquina Heads Light-house	S. 21½	E.	96 miles.
Tillamook Rock Light-house	S. 24½	E.	21 miles.
Point Adams Light-house	S. 55	E.	5¼ miles.

From the *North Head* of Cape Disappointment we give the following bearings and distances to the northward:

Cape Shoalwater Light-house	N. 22	W.	25 miles.
Gray's Harbor, proposed Light-house	N. 26	W.	39 miles.
Destruction Island, proposed Light-house	N. 33	W.	83 miles.
Jagged Islet and Carroll Rock, near Cape Johnson	N. 37	W.	105 miles.

From Cape Orford to Cape Disappointment the extent of ocean shore-line, not following the many intricate curvings, is two hundred and eighty-five miles.

On the 17th of August, 1775, Don Bruno de Heceta, commanding the frigate *Santiago* (one of his two vessels), says that he saw "una boca que se llamo de la Asuncion, o entrada de Heceta." He failed to enter it on account of great conflicting currents which caused him to believe that it was the broad mouth of some large river, or the strait which gave it passage through to the sea. He placed himself in twenty-four fathoms of water between the two capes, which he named San Roque and Frondoso. A critical examination of the manuscript text, and knowledge of the appearances of the headlands which stand out prominently to one who is making the coast, leaves no doubt in our mind that he referred to Cape Disappointment as the Cabo San Roque, and to Tillamook Head as the Cabo Frondoso. In the position which he held, and from which he had to escape on account of the strong currents, he could not have been nearer the shores than six miles, and he would not have noted the low and comparatively unimportant Point Adams. He placed Cape San Roque in latitude 46° 17'.

1778 On the 6th of July, ~~1878,~~ Meares, in the ship *Nootka*, arrived off the Cape and found that a "prodigious easterly swell rolled on the shore," and he had soundings in sixteen fathoms over a hard sandy bottom. "After we had rounded the promontory a large bay, as we had imagined, opened to our view, that bore a very promising appearance, and into which we steered with very encouraging expectation." As he steered into this bay "the water shoaled to nine, eight, and seven fathoms, when breakers were seen right ahead, and, from the mast-head, they were observed to extend across the bay. We therefore hauled out. * * * The name Cape Disappointment was given to the promontory, and the bay obtained the title of Deception Bay." By an indifferent observation he placed it in latitude 46° 10'.

It was called Cape Hancock by Gray early in 1792, and the entrance placed in latitude 46° 17'. He changed this name to Cape Disappointment upon hearing that Meares had so named it.

Vancouver continued the name Cape Disappointment and placed it in latitude 46° 19'. The name was also retained by Belcher in 1839, and by the United States Exploring Expedition in 1841. Duflot de Mofras (1844) calls it Cape San Roque ou Disappointment.

It was called Cape Hancock or Disappointment at the first examination of the entrance to the river in 1850, and the name Hancock subsequently in a secondary manner on the Light-house List, but the name Disappointment is that used on the official charts and by all navigators.

The Indian name of the Cape is Kah'-eese.

THE BAR AND ENTRANCE TO THE COLUMBIA RIVER.

The entrance to the Columbia River is a little over five miles wide between the nearest points of Cape Disappointment and Point Adams, which bear northwest by west and southeast by east from each other. But the narrowest part of the river mouth inside of Cape Disappointment is between Point Adams, abreast of Fort Stevens, and the rocky spur jutting from Scarborough Hill, where the width is almost exactly three miles and the bearing north ten and a half degrees east (N. 10½° E.).

Heceta called the entrance Asuncion Bay; or possibly the strait from a great river. Vancouver called it an Inlet to a bay or small river; and subsequently Broughton refers to the lower reaches of the river as a Sound.

Broad off the line joining Cape Disappointment and Point Adams there is an irregular semicircular bank (or bar) of shifting sands lying about four miles out at the limits of five fathoms; and just inside of this line, and about half-way from the Cape to Point Adams, there is a sandy shoal, a small portion of which is above water at the highest tides and is known as Sand Island. There is always one, and generally more than one, main passage through these sandy obstructions, dividing them in several parts to which separate names are applied. Clatsop Spit is that part reaching out from Point Adams; Peacock Spit is the sandy shoal generally connected with Cape Disappointment; whilst the outermost curve of this bank is known as the Middle Sands. When there are two main channels, they are called the North and the South Channel. Sometimes these channels divide to the eastward of Sand Island, the North Channel leading out north of that obstruction and between the Peacock Spit and the Middle Sands, the latter being at such times connected with Sand Island; the South Channel leads out between Sand Island and the Clatsop Spit, and thence curving to the southward between the latter and the Middle Sands. When these channels divide to the westward of Sand Island the North Channel separates the Middle Sands from Sand Island and from the Peacock Spit; whilst the South Channel makes its way, as before, between the Clatsop Spit and the Middle Sands. When there is but one channel the Middle Sands proper is cut in two, the southern part being joined to the Clatsop Spit, and the northern to the Peacock Spit; Sand Island, at such times, is pushed well over to the northward towards Baker's Bay, and may disappear altogether, as we know it did not exist at the time of Broughton's Survey. The numerous detailed surveys that have been made of the entrance and the approaches at different times prove conclusively the great changes constantly going on in the channels among the shoals, and in the position of the shoals.

During heavy weather, and especially in winter, the sea breaks with terrific fury from the northwestward of Cape Disappointment round the outline of the outer great shoals and across the bar well to the southward of Point Adams. Few places present a scene of more wildness than this long, curved line of breakers; when the fury of the storm is somewhat spent the channels are the first to smooth down, and then the breakers on either hand are good means for marking the line of deepest water. When the sea is wholly smooth there is not a breaker to be seen on the smoothest spot, and the passage across the bar can be known only by ranges and buoys. The approach to the entrance is now marked by a large whistling buoy, and thence the bars and the channels are marked not only into the river but for ninety miles to Portland.

The currents are very strong and, inside the outer shoals, very irregular and conflicting. In 1851, when off Sand Island, we measured the strength of the ebb current, and found it nearly five and a half miles per hour. In 1868, when the channel was much wider and deeper, the observations of the Coast and Geodetic Survey showed a maximum velocity of only three and four-tenths miles per hour near the same position.

A series of observations was then made to show the direction and velocity of the current during each quarter of the ebb and flood from the bar to Astoria. There are several generalizations therefrom that are of interest. These observations show, firstly, that in the main channel there was no slack water at the change of tides from flood to ebb; secondly, that off the entrance to the then north channel the maximum velocity of the flood was two miles per hour, and the maximum velocity of the ebb two and three-tenths miles; in the north channel the maximum velocity of the flood was two and one half miles, and of the ebb two and seven-tenths miles per hour. About a mile eastward of Cape Disappointment an ebb current of four and four-tenths miles was measured; and at one mile east of Sand Island the flood ran one and one-half miles per hour and the ebb four miles. While it is useless to point out the force and direction of the currents in the river from the bar to Astoria from that year's work, yet the foregoing figures show clearly the greater velocity of the ebb current over the flood. This depends upon the greater volume of water passing out on the ebb current; it is corroborated by the fact that during June, the season of freshets, potable water can be taken up for the use of vessels at the bar.

Columbia River: current to the northward.

The Davidson Inshore Eddy Current immediately northward of the Columbia River is manifested by the fact that nine out of ten buoys that get adrift off the Columbia River go ashore on the outside abreast Oysterville, Shoalwater Bay. One went to the Quillihute River, one hundred and five miles.

This is further shown by the remarkable drift of the large nun-buoy, No. 1, painted black, from the Bar of the Columbia River to the shores of Alaska. This buoy broke from its moorings at the

bar in January, 1889. It was next seen on the 24th of June in the Shelikoff Strait, [illegible] Kadiak Island and the peninsula of Alaska. On the 26th of June it was picked up by the [illegible] *Al-Ki* in latitude 57° 21′ north and longitude 154° 45′ west, about fifteen miles south southwest from the mouth of the Karluk River. On the 24th of June it had been seen about ten miles southwest from the Karluk. It had come through the strait from the northeastward [illegible] had traveled fifteen miles in two days. Assuming the buoy to have broken from its moorings January 10 and to have followed the general trend of the coast, it must have traveled not less than fifteen hundred and forty miles in one hundred and sixty seven days, or an average of nine miles a day.

The coast eddy current, or littoral drift, in the vicinity of this river, moves to the northwestward close along the shore, varying in width and strength according to the prevailing weather. On the 15th of May, 1869, the buoy on the south end of the Middle Sands went adrift, and was found on the 15th of July at Cape Cook, Vancouver Island, in latitude 50° 07′, longitude 127° 51′, three hundred and forty miles distant. It was badly indented and appeared to have been on the beach for some time.

In or about October, 1854, there was discovered one mile north of the Copalis River the whole stern frame of the propeller *General Warren*, which had been wrecked on Clatsop Spit more than two years previously, having been carried by the prevailing littoral current at least [illegible] miles from its original position accurately determined by the Coast Survey in 1852, when it was a little more than a mile from Point Adams.

This direction and movement of the inshore eddy current is established by much cumulative evidence.

These strong and conflicting currents, the heavy swell, and the sandy bottom of the bar, channels, and approaches, combine to work swift destruction upon a vessel which is stranded on the outside, and also in a little less degree with those that take the ground inside. A vessel is very soon broken up, and disappears in a few days. It is doubtful if any vessel was ever saved after being on the outer sands.

When off the entrance in fine, clear weather, the beautiful snow peak of Mount St. Helens shows over the lowest part of the interior in the general line of the Columbia River valley. It is very regular in outline and presents a pyramidal appearance, having the base equal to either side. It is over seventy-five miles to the eastward of the entrance to the river, and its height is nine thousand nine hundred and ninety-four feet. The mountain is volcanic, and occasionally discharges volumes of smoke.

When this mountain shows over Point Adams, Tongue Point is seen under its left flank, and four diameters to the right is seen the half-wooded Coxcomb Hill, over the Point Adams light-house. Well to the southward is seen Saddle Mountain, and Tillamook Head inside of the faint outline of Cape Falcon. The bright green patch on Scarborough Hill is seen well to the northeastward, and the North Head of Cape Disappointment is the limit of the land view towards the north.

Vancouver named Mount St. Helens in 1792.

INSIDE THE COLUMBIA RIVER.

Sand Island.—This low, sandy island is the visible danger in the middle of the entrance to the river. It lies inside the line joining Point Adams and Cape Disappointment. In 1841 it was almost abreast of Point Adams and less than one-third the width of the river from the point. In 1850 it had moved a little seaward, and was farther from Point Adams. In 1868 it was more than half-way across to Cape Disappointment but inside the line. In 1886 it had taken a shape like a boomerang with one point a mile and a quarter east of the Cape and on the same parallel, and the other point bent up the river and three miles northwest from Fort Stevens.

It is about two miles long and has an average width of nearly four hundred yards. It consists of loose sand raised a few feet above the river and covered with stranded trees, driftwood, etc., brought down by the freshets. Formerly the North Channel ran around the northeast side of this island, but the shoal from its northeast side has spread towards the Chinook Shoal. It also has developed towards Sand Island, and now there is passage way for only nine or ten feet of water in place of four fathoms. The main channel of the river passes close under the south side of Sand Island and, striking the great Middle Sands, is divided, one part moving to the south and the other to the northwest.

There is a beacon built upon this island to afford ranges for vessels. During the fishing season there are sometimes net-racks and other temporary buildings on Sand Island for the accommodation of fishermen.

Baker's Bay.—This is the deep recession of the shore to the northward of Sand Island between the extremity of Cape Disappointment and Chinook Point. The western shore of this bay is the east side of the Cape for nearly three miles in a general northerly direction; thence the shore sweeps to the eastward and southeastward for six miles to Chinook Point. The latter stretch of shore is low, bordered by extensive marshes, and receives the waters of the Wallacut and the Chinook Rivers. The Wallacut River (Wal la-khut) enters at the northernmost bend of the bay shore; it is a small stream coming through marshes from the direction of Shoalwater Bay, which it very nearly reaches. The Chinook River (Wap-pa-loo-chee) enters two miles farther to the eastward; it has more the character of a slough, three or four miles long. The north shore of Baker's Bay and the south shore of Shoalwater Bay are only three and a quarter miles apart, and the land between them is quite low although densely wooded and matted with thick underbrush.

Baker's Bay was formerly a deep and easily accessible harbor with a fine anchorage and protection close under the eastern shore of Cape Disappointment. The main ship-channel passed close under the Cape, and well into Baker's Bay, carrying six and seven fathoms, and at its shoalest part not less than three and a half fathoms. In 1851 Sand Island lay nearer Point Adams than the Cape, but it has gradually worked to the northward and a little westward until it has completely blocked up Baker's Bay, and the Chinook Spit is joined to the eastern side of the island. The northwest point of the island is now advanced so far into Baker's Bay as to be to the northward of the point of the Cape. To natural causes for shoaling the bay have been added artificial obstructions in the shape of large numbers of fish-traps.

Inside the bay the principal object of note to the navigator was "*Leading-in Bluff*," which is a rocky cliff of moderate height one and three-quarters miles north one-third west (N. ⅓ W.) from the easternmost part of the Cape and in range with it when entering by the South Channel; but as the bar has changed its position this range is not now available. Immediately inside the Cape, in the cove with low shores and a sand beach, are the houses and barracks of the military station known as Fort Canby, and the houses for the Light-house keepers and Life-saving Service. A very substantial wharf is built here.

Just to the westward of Leading-in Bluff is the watering place known as Ilwaco, a thriving settlement with a large cannery. There is a road leading through the forests to the great sand beach north of Cape Disappointment and locally known as the Weather Beach.

Life-saving Station.—A first class life-saving station, with crew always on duty, is established in Baker's Bay on a wharf adjoining the military wharf.

Baker's Bay was named by Broughton in 1792. In 1805-'6 Lewis and Clarke called it Haley's Bay.

Chinook Point.—This is the western part of the long, rounding point which lies on the north side of the river broad off the north shore of Point Adams. The south side of this point is two miles long east and west, and Chinook Point proper is the southernmost part of the low shore one and five-eighths miles west of Point Ellice. Less than a quarter of a mile behind it the flat wooded margin changes to a wooded hill which rises rapidly towards the north. In front of the point is a long, low sand strip with a broad, low-water sand beach. The three-fathom line lies four hundred yards outside the low-water mark. East of Chinook Point and nearer Point Ellice there was an assemblage of fishing huts. West of Chinook Point, six-tenths of a mile, the beach is broken by the rocky spur from Scarborough Hill projecting beyond the high-water sand beach. This spur is grass and fern covered and reaches three hundred and twenty feet elevation in one-third of a mile to the north.

There is now quite a settlement at Chinook Point and a large cannery between it and Point Ellice.

Chinook Point was the favorite location of the once powerful tribe of Chinook Indians, and here the celebrated one-eyed chief Concomly held sway. In 1851 the tribe had dwindled to less than a hundred persons—men, women, and children—and they were poor, miserable, drunken, diseased wretches.

The point was called Village Point by Broughton in 1792. In 1839 it was called Chenoke Point by Belcher. It was named Chinook Point by the Coast Survey in 1850. The Indian name is now Nóse-to-ilse.

Scarborough Hill.—This is a well-known landmark and leading-in range on the north side of the river behind Chinook Point. The highest part lies three and a half miles north by [illegible] by E.) from Fort Stevens on Point Adams, and five and three-quarters miles east three quarters north (E. ¾ N.) from Cape Disappointment Light. It is a long, gradually rising hill-side stretching from a narrow point and ridge at the river's edge to the summit of the ridge. It is covered with grass, fern, and sallal bushes, and presents an unusually bright-green appearance between either side and behind it the hills are covered with the dense forests of dark-green fir. It is the only grass-faced hill on the north side of the river inside Cape Disappointment visible from seaward.

The geographical position of the U. S. Coast and Geodetic Survey station on the hill-side, half a mile back from the river, is:

Latitude	46	15'	23".4 north
Longitude	123	55	03".8 west.

The hill was called Chinook Hill by the United States Exploring Expedition in 1841, but was always known to the Hudson Bay Company's people as Scarborough Hill, and this name has been retained by navigators.

The rocky point where the hill reaches the river border has been named *Scarborough Point.*

Point Ellice.—This point is on the north side of the river four and one-fifth miles north sixty degrees east (N. 60° E.) from Fort Stevens, and three and two-fifths miles north fifty degrees west (N. 50° W.) from Astoria. It is one and five-eighths miles east of Chinook Point. The broad sand beach coming from Baker's Bay, and broken only by Scarborough Point, ends just before Point Ellice is reached, and the deep water comes close to the shore. The point itself is somewhat rounding and rocky, but not high. The land behind it rises to two hillocks, of which one is two hundred and forty feet elevation at one-sixth of a mile from the river, and the other is still higher farther inland. It is covered with a heavy growth of trees. These hillocks were used as range marks before the bar and channel were thoroughly buoyed.

The deepest channel of the river runs under Point Ellice where it is half a mile wide between the three-fathom lines, and the depth reaches fourteen to fifteen fathoms.

One and three-eighths miles to the northward of Point Ellice in a small recession of the steep cliffs there is a large cannery.

It was called Ellis Point by Belcher in 1839, and named Point Ellice by the United States Exploring Expedition in 1841, after Edward Ellice, then one of the Directors of the Hudson Bay Company.

The Indian name is No-wehtl-kai ilse.

Cliff Point lies one and seven-eighths miles to the northward of Point Ellice. It is a high rocky bluff with deep water under it at the time of the survey. One and a quarter miles [illegible] Cliff Point is a settlement known as Knappton, formerly Cementville. There is a saw-mill and cannery here. Formerly the Rosendale Cement was manufactured here and shipped thence.

Tansy Point.—This is the low point on the south side of the river a little over two miles [illegible] by south half south (E. by S. ½ S.) from Fort Stevens. It is low, marked by small sand dunes with low marshy ground behind it, through which drain Tansy and Alder Creeks. There is a broad low-water sand beach in front of the point, and the three-fathom curve lies three hundred and forty yards outside the shore-line. A black buoy marks the north side of the channel [illegible] of Tansy Point, and there is deep water and a strong current in the channel-way between the and the point.

At the mouth of Tansy Creek, southeastward of the point, there is a large cannery and quite a settlement along the shore.

Smith's or Young's Point.—Eastward from Tansy Point there is a broad, shallow bay, known as Young's Bay, which receives the waters of the Skeppernawin Creek, Lewis and Clarke's River and Young's River. This last stream runs under the south side of the high, narrow ridge of rough forest land whose western extremity is Smith's Point. It is the first high point made after passing Fort Stevens, from which it bears east one-fifth north (E. ½ N.) distant four and [illegible] miles. The ridge rises to over four hundred feet elevation at Coxcomb Hill behind Astoria. From Smith's Point the northwest shore swells out and curves to the northeastward for over a mile to Astoria.

There is a long shoal stretching westward from Smith's Point for over three-quarters of a mile towards Tansy Point. The fifteen-feet channel to Young's River runs on the south side of

this shoal and the deep channel of the Columbia on the north side. One mile before being up with it there is a black buoy at the edge of the three fathom curve on the north side of the channel. On the northwest side of the point, outside of six feet of water, a *stake red light* has been placed. It is a little over half a mile southwestward of the town of Astoria. The characteristics of these lights are given in the annual list of the Light-House Board.

This point was called Point George by Broughton in 1792; George Point by Belcher in 1839; Young's Point by the United States Exploring Expedition in 1841; Young's Point by the Coast Survey in 1850; Smith's Point by the Coast Survey in the triangulation of 1852; this name has been retained on the later charts. Lewis and Clarke landed under this point but did not name it.

Young's Bay.—The deep recession of the south shore between Tansy Point and Smith's Point is known as Young's Bay. It falls back one and a half miles, and at the eastern part stretches nearly two miles eastward behind Smith's Point, so that the high land between the shores of the Columbia at Astoria and Young's River is really a promontory about a mile wide and more than two miles long. On this promontory, behind Astoria, is Coxcomb Hill. Into the western part of Young's Bay under Tansy Point enters several creeks through the low, marshy lands. Towards the outer edge of the flats off the mouth of Skeppernawin Creek there is now a piled wharf serving as a fishing station. Between that creek and Lewis and Clarke's River the old marsh line has been diked, and now numerous farm-houses are seen along the shore. The latter river, a quarter of a mile wide at its mouth, empties into the bay one and one-third miles south-southeast from Smith's Point. On this river Lewis and Clarke established their winter quarters three and a quarter miles from the mouth. Young's River empties in the easternmost part of the bay. It is quite a large stream, a quarter of a mile wide at its mouth, with a deep channel. On the north shore of the bay, half-way between Smith's Point and Young's River, there is now a large establishment for manufacturing fish oil.

Lewis and Clarke called this Meriwether's Bay.

Young's River was discovered, examined, and named by Broughton in 1792, and the name has extended to the Bay.

Astoria.—This town is on the North side of the high promontory formed by Young's River on the south and the Columbia on the north. The western part of the town is four and three-quarters miles north eighty degrees east (N. 80° E.) from the stake light near Fort Stevens.

The *Astor Point* of a few years since is completely obliterated, and the place is covered by part of the town of Astoria, which has projected itself out to deep water. The whole shore is covered with buildings and with wharves; the line of wharves is carried eastward from near Smith's Point for two miles to Upper Astoria; and even still further towards Tongue Point. Astoria has developed so largely since the inception of the salmon fisheries for the catching and preserving of that fish, that the whole bight between Astor Point and Upper Astoria is now a straight line and the twenty-five or thirty wharves project into the deep waters of the channel. The rough hill-sides have been cleared of the dense growth of fir, and now fine houses, schools, and churches, climb up the steep slopes.

An enormous business is done here during the "Salmon season," from April to July, inclusive, when several thousand fishermen are employed, and probably more than a thousand boats are on the river as far out as the Bar at one time.

Extensive wharves receive the ships which carry away the Salmon, and others load with wheat from the interior. Many ships come down laden from Portland and either pass Astoria or lie here a day or two waiting a favorable opportunity to cross the bar, the pilots and tugs for which, have their headquarters here. Large ocean steam-ships are continually arriving and leaving, and all pass up to Portland. Fast River Steam boats make daily or frequent trips from Astoria, Clatsop, and Ilwaco to Portland and other towns on the river.

In 1888 there were reported the following wharves at this place exclusive of the two wharves for the ocean steamers and river steam-boats: salmon canneries, twenty-four; box factories, two; saw-mills, two; wood, one; with shoaling in front of some of them.

The channel which passes along the Astoria shore is reduced to three hundred yards in width by the building out of wharves. The north side of the channel is quite steep-to, and abreast of Upper Astoria it is even bare at low water. Extensive areas have less than six feet of water upon them; but abreast of the western part of Astoria there is a broad channel of eight or nine feet depth connecting the Astoria Channel with the Middle Channel.

In this Astoria channel thence to Tongue Point there are two rocks which narrow the channel,

the *Gilman Ledge*, marked by a red buoy, on the edge of the three-fathom line at the south side of the channel, and the *Silvie de Grace Rock*, around which a shoal has formed, also marked by a red buoy. Just beyond the latter buoy the channel curves sharply towards the east and contracts to one hundred and twenty-five yards in width inside the three-fathom lines; and abreast the black buoy, five eighths of a mile nearer Tongue Point, the channel is only one hundred and fifty yards in width but opens beyond.

These contractions, together with artificial ones by the building out of wharves, must have a disastrous effect upon the Astoria channel; for it is a possibility that said channel may be further throttled between Smith's Point and Tongue Point and be reduced to a blind passage liable to rapid filling in.

The geographical position of the U. S. Custom-house in Astoria, as reduced from the position of the old astronomical station of the Coast Survey on Astor Point, is:

Latitude	46° 11′ 17″.5 north
Longitude	123° 50′ 14″.6 west.
Or, in time	8ʰ 15ᵐ 21ˢ.0.

Coxcomb Hill.—This is a moderately high hill on the south side of the river behind the town of Astoria. The northern half of the hill is now denuded of its high fir trees. It is used, by the pilots and navigators familiar with the entrance to the Columbia River, as a range with varying parts of Point Adams to indicate the positions of the southern tail of the Middle Sands and the Bar.

Tongue Point[•].—This is a prominent point on the south side of the river about three and a half miles from Astor Point. It bears north sixty-six degrees east (N. 66° E.), distant eight and a half miles from Fort Stevens on Point Adams, and north eighty five degrees east (N. 85° E.), distant twelve and four fifths miles from Cape Disappointment Light-house, the line passing over the low beach at Chinook Point. It is a bold, rocky peninsula about three hundred feet in height, and covered with fir trees. It stretches out north-northeast for three-quarters of a mile from the main shore, to which it is connected by a low and very narrow neck of land. The northern point is steep and sharp, and seventy-five yards to the eastward of it lies a small *rock awash* at high water. The currents sweep past this point with great force, and, owing to the peculiar obstruction which it forms, occasion deep scouring directly off it, where a depth of thirty fathoms is found at two hundred yards. From this point the deep and broad middle channel of the river divides into three deep channels stretching across and up the river. The main ship-channel is buoyed, and changes in location of the buoys are made whenever the change in the channel demands it.

Tongue Point is a well marked object when a vessel is off the bar of the river, and appears like a low wooded island. It is a good range mark under all changes of position of the bar.

A *stake light* is placed on the western shore of Tongue Point three-eighths of a mile from its northern extremity. This is a white light and is one of the numerous lights of similar character which have been placed along the river's course to mark the channel for vessels.

The characteristics of these lights are given in the annual list of the Light-House Board.

From Tongue Point the following bearings and distances are given in addition to those already mentioned: Point Ellice south eighty-four degrees west (S. 84° W.), distant five and one-eighth miles; Gray's Point north twenty-eight degrees west (N. 28° W.), distant three and five-eighths miles, this gives the width of the river; Yellow Bluff, under the southwest part of Flat Hill north twenty-four degrees east (N. 24° E.), distant four and four-fifths miles; Jim Crow Point north forty-nine degrees east (N. 49° E.), distant eight and a half miles.

Tongue Point was so named by Broughton in 1792; Lewis and Clarke called it Williams Point in 1805–'6. The Indian name of the point is Soo kum-its-é ah.

Cathlamet Bay.—This is the broad and rather indefinite area of the south side of the river lying east of Tongue Point, and may be considered to embrace the channel extending directly east of Tongue Point and leading to the Prairie Channel, which lies between the Seal Islands and some unnamed, low, marshy islands nearer Tongue Point. This would extend it four miles directly east. Close around the southern shore of this bay (into which enters John Day's River) there is a very narrow channel carrying about seven or eight feet of water in the shoalest parts towards the eastern mouth.

[•] "To which we gave the name Tongue Point;" Franchere, p. 104. He was in Baker's Bay in the ship *Tonquin* in 1811.

Gray's Point.—This is the moderately high wooded point on the north side of the river three and five-eighths miles north twenty-eight degrees west (N. 28° W.) from Tongue Point. It lies four and seven-eighths miles north forty-five degrees east (N. 45° E.) from Point Ellice. There is as much as ten fathoms of water immediately under the point, but there is no deep channel to the east or to the west. Yellow Bluffs lie four miles north seventy-three degrees east (N. 73° E.) from this point, and between them lies Gray's Bay.

It was named Cape Broughton by Belcher in 1839, but was called Gray's Point by the U. S. Exploring Expedition in 1841. On the earliest Coast Survey charts it was called Cape Broughton, but on the later ones it is designated Gray's Point. The point in the bight between Point Ellice and Gray's Point, now called Cliff Point, was named Chatham Head by Belcher in 1839. There is no name to this bight, but near its deepest part there is a large establishment embracing a cannery and a saw-mill at Knappton, formerly Cementville.

The easternmost projection of Gray's Point is known as Portuguese Point.

Yellow Bluffs.—This is the rounding and rocky southwest face of Flat Hill, a great basaltic mass rising abruptly from the river and reaching an elevation of thirteen hundred feet in five-eighths of a mile. There is shoal water on the west side of the point, but a deep channel under the south face of Flat Hill. Yellow Bluffs and the comparatively low but wooded shore to the northward to Gray's River form the eastern boundary of Gray's Bay.

Under the southern face of Flat Hill, where the deep channel is close to the shore, a *stake light* has been placed about one and one-tenth miles eastward of Yellow Bluffs. It shows a *white light*, and is one of the numerous lights up the river. The characteristics of these lights are given in the annual list of the Light-House Board. It is eight miles from Astoria.

Gray's Bay.—This is the shoal bay, two miles deep, lying between Gray's Point and Yellow Bluffs. Large patches are bare at low water, especially in the eastern part, but a moderately deep channel runs close under the northwest shore from the mouth of the Alamicut or Deep River, past Portuguese Point and Gray's Point.

Alamicut River opens about a mile west of Gray's River and at its mouth the banks are low but densely wooded.

The bay was named by Broughton in 1792 in honor of Captain Gray.

Abreast of Flat Hill the river is five miles broad, but the southern part is wholly occupied by low islands which are in part marshy and in part covered with cottonwood. There are numerous channels through them, with one principal one called Prairie Channel which is buoyed.

Thence to the eastward between Jim Crow and Three Tree Points, on the north shore, and Cathlamet Point on the south shore, the river narrows down to two miles in width, with half that space occupied by shoals and islands.

From two to two and a half miles eastward from Yellow Bluffs there are two fishery stations and a landing. Abreast the lower of these stations, on the opposite flats, bare at low water, there is another fishing station.

Pillar Rock.—This is a small, black, projecting pillar of conglomerate rock, thirty feet above the lowest water and thirty feet in diameter. It stands under the north shore of the river, three and seven-eighths miles above Yellow Bluffs and one mile below Jim Crow Point; it is eleven and a half miles from Astoria by the channel. It is three hundred and forty yards from the steep shore, and rises from a long twelve-feet shoal parallel with the shore. Between this shoal and the shore there was a three-fathom channel in 1868. The main channel formerly ran close under the south side of the shoal, but now it is half a mile to the southward, the shoal having developed.

The Pillar Rock Salmon Cannery is located on the shore directly abreast of the Rock.

Broughton in 1792 says:

> This remarkable pillar rock lies about a mile from the shore on the starboard or southern side of entrance into the river. Not only within, but without this rock, the water is very shallow, with overfalls from two and a half to six fathoms; but by keeping the northern shore aboard from Gray's Bay, a sufficient depth of water will be found.

Lewis and Clarke say that—

> Immediately opposite our camp is a rock at the distance of a mile in the river, about twenty feet in diameter and fifty in height.

Belcher in 1839 says it rises thirty feet above the sea from a depth of five fathoms. The summit is ten by five feet and is covered with bushes and grass.

The U. S. Exploring Expedition (1841) says the rock is twenty-five feet high and only ten feet square on top. It is composed of conglomerate. The Indian name is Talnaptea.

Jim Crow Point.—This is one of the well known landmarks along the river, and is abreast the first decided contraction of the river to a main channel-way seven-eighths of a mile wide between it and Woody Island on the south.

It is a vertical rocky cliff, rising to one hundred feet, and projecting sharply from the shore for two hundred and fifty yards; while behind it the basaltic cliffs, fir-covered, rise to eleven hundred feet in less than six hundred yards from the water. The currents sweep very swiftly past it with deep eddies and boiling; the bottom is scoured out to a depth of twenty-two fathoms, with five and six fathoms of water in mid stream.

In the bight a little over a quarter of a mile northeast from the point there is located the Brookfield Salmon Cannery. Jim Crow Point is twelve and a half miles from Astoria.

Woody Island.—This low island is the first fir-covered island near the main channel of the river. As soon as a vessel has rounded Tongue Point this island shows dark and distinct from the other islands to the southwest of it, which are covered with cottonwood and bushes. It lies one mile southeast from Jim Crow Point, and the main channel passes between them. The island is about one mile long, east and west, by half a mile wide. The fir trees are on its western end, with a few straggling ones on the eastern extremity.

On the north shore of Woody Island was a fishing station in 1885.

The Woody Island Channel, formerly the main channel and used by all ocean steamers and sailing vessels, runs on the northwest side of Woody Island and along the northwest sides of the marsh islands to the southwest of it; thence it winds through the shoals through the middle of the river to Tongue Point. It is partly buoyed.

Three Tree Point.—On the northern side of the river, one and seven eighths miles from Jim Crow Point, there is a slight but sharp projecting point of basaltic rock, rising rapidly to one hundred feet high. It had upon it three fir trees which served as good marks for the river pilots. The basaltic but wooded cliffs behind it rise to seven hundred feet in one-third of a mile.

The river is here one and seven-eighths miles wide between the high points, but it is largely occupied by sand flats and low islands, through which pass several narrow channels for small vessels. The main ship-channel is close under Three Tree Point, and is less than one-quarter of a mile wide but carries over twenty fathoms of water directly off the cliffs. The channel follows close under the high cliffs to the northeast and then under the low but heavily wooded shores of the north bank.

The high cliffs northeast from the point reach twelve hundred and fifty feet at less than half a mile from the river.

About one-third of a mile southwest from the point there is a Salmon cannery known as Fisherton; about half a mile to the northeast there was the Glen Ellen Cannery, which has been burned and abandoned; and at one and five eighths miles to the northeast, where the low shore begins, is the Ocean Cannery.

Three Tree Point is fourteen and one-third miles from Astoria.

Cathlamet Point.—This is the high point on the south side of the river, one and nine tenths miles south thirty-one degrees east (S. 31° E.) from Three Tree Point. The point is the northwest termination of a rocky spur which projects more than two miles beyond the general margin of the basaltic formation. It reaches an elevation of four hundred and fifty feet only one-quarter of a mile back from the point, and gradually increases to over one thousand feet. It is densely wooded. It is here where the river has its narrowest regimen between the basaltic walls of the cañon-like valley. Part of this width is occupied by low, marshy islets in part wooded, in part having such gentle slopes that the shore-line can not be well defined. The main channel runs close under the north shore; and a channel carrying less than six feet of water runs close under Cathlamet Point.

The detailed description of the points and reaches of the great Columbia River will end here, a further continuance not being within the scope of the original plan of this work. When Broughton, in 1792, made the first examination of the river from the mouth to Point Vancouver, above the mouth of the Willamette, he considered the lower part, from Cape Disappointment to two or three miles east of Cathlamet and Three Tree Points, an estuary to the mouth of the river proper. He says: "The two points of entrance into the river are formed by low, marshy land, the southernmost seemed to be an island; and to the NW. of the most northern, a branch took a northerly direction, which was Orchard's River." This river is now named the Skumaquea Creek, and the low land opposite is Welch's Island and Tenasillihee Island.

The course of the river thence to the Cascades is not in the middle of the Cañon-like valley, but runs from one basaltic wall to the other, thus crossing and recrossing. Where the river is narrowest the depth of water is greatest; where it broadens out there is less depth of water, and in several places there are "bars" in its course to Portland. By appropriations from Congress these obstacles to navigation are removed as far as practicable. All vessels are now towed up and down the river, and are in charge of River Pilots. Very frequently the fogs and dense smoke of summer are serious impediments to navigation and cause some delays. But upon the whole the river is singularly free from actual dangers to navigation. The Buoys (ninety-two in 1885) and river lights (twenty-six in 1885) are being continually changed whenever the river makes new channels for itself.

Following the present main channel of the river from the entrance midway between Cape Disappointment and Point Adams, we have the following distances to important points: to Astoria, nine miles; to Tongue Point, twelve miles; to the south part of Yellow Bluffs, seventeen miles; to Pillar Rock, twenty and a half miles; to Jim Crow Point, twenty-one and a half miles; to Three Tree Point, twenty-three and a half miles; to the town of Cathlamet, thirty-one and a quarter miles; to Cape Horn, thirty-six and a quarter miles; to Mount Coffin, fifty and two-thirds miles; to Rainier, fifty-three and seven-eighths miles; to the mouth of the Cowlitz, fifty-four and a quarter miles; to Coffin Rock, fifty-eight and one-eighth miles; to Kalama, sixty and a quarter miles; to Vancouver, eighty-eight and a half miles; to Portland, ninety-three and a half miles; and to the Lower Cascade, one hundred and twenty-three and a half miles.

AIDS TO NAVIGATION FOR APPROACHING AND ENTERING THE COLUMBIA RIVER.

Tillamook Rock Light-house and Fog-signal, Point Adams Light-house, and Cape Disappointment Light-house have already been described. Besides these permanent aids to navigation, there are the usual buoys to mark the different channels. The approaches, the channel or channels across the bar of the river, the channels up the river to thirty-seven miles above the mouth of the Willamette, and the channel of the Willamette to Portland, are all thoroughly buoyed. It is useless to describe all these buoys in detail because they are continually being changed to conform to the changes in the channels.

The list of all these buoys, as well as the range or stake lights in the river, is published on the 1st of October of every year by the Light-House Board, and a copy of the list is sent free to any ship-master upon application to the office of the Light-House Board at Washington, D. C., or to the Inspector of the Thirteenth Light-house District at Portland, Oregon.

In February and October, 1888, notice was given not only of the change of buoys, but that there was a depth of sixteen to eighteen feet of water over the Middle Sands, which channel should not be attempted by strangers.

The constant shifting of the channels and positions of the buoys clearly indicate that every season brings such changes that the publication thereof in any form is of little practical use to the navigator, and may be of absolute danger. (May, 1889.)

The buoys marking the entrance as far as Astoria only are enumerated, and their characteristics described, in the order in which they are passed by vessels coming from seaward; and the bearings for locating the Whistling Buoy only are given. The buoys are placed so close together that in clear weather one or more can be seen at the same time; and this enumeration of them in succession will indicate to a ship-master the character of the buoy he is next to look for after passing each.

The Outside Buoy.—This is a *first-class whistling buoy, painted with black and white perpendicular stripes*, placed in eighteen fathoms of water outside the bar of the South channel to the Columbia River. The whistle is sounded by the action of the sea, giving from twenty to thirty blasts a minute, which under favorable circumstances can be heard five or six miles. This buoy may be passed on either side. The following bearings and distances locate this buoy (1886):

Tillamook Rock Light-house, southeast by south (SE. by S.), distant thirteen and five-eighths miles; Point Adams Light-house, northeast three-eighths east (NE. $\frac{3}{8}$ E.), distant four and seven-eighths miles; Cape Disappointment Light-house, north three-quarters west (N. $\frac{3}{4}$ W.), distant six and three-quarters miles.

Pilots and masters of vessels are requested to notify the Light-house Inspector at Portland if this buoy should drift from its position, or not work satisfactorily.

Sea Buoy.—This is the next buoy for the South channel; it is a *first-class can-buoy, painted with black and white perpendicular stripes*, and placed in twelve and a half fathoms of water about one and one-eighth miles north three-quarters west (N. ¾ W.) from the Whistling Buoy. It may be passed on either side.

Fairway Buoy.—This is a *first-class nun-buoy, painted with black and white perpendicular stripes*, and placed in six and a half fathoms of water outside and close to the bar. It lies about three-quarters of a mile north three-quarters west (N. ¾ W.) from the Sea Buoy, and may be passed on either side but close-to.

The sea does not break at this buoy in good weather.

Bar-Buoy.—This is a *first-class nun-buoy, painted with black and white perpendicular stripes*, and placed on the bar in four and one-third fathoms of water at the best point of crossing. It lies at present (1886) about seven-eighths of a mile north by west one-eighth west (N. by W. ⅛ W.) from the Fairway Buoy. It should be passed close to on either side.

Mid-channel Buoy.—This is a *first class can-buoy, painted with black and white perpendicular stripes*, and placed inside the bar in about five fathoms of water. It lies at present (1886) about one mile north seven-eighths west (N. ⅞ W.) from the Bar-Buoy. It should be passed close to on either hand.

Clatsop Spit Buoy.—This is the next buoy in the South channel. It is a *first class nun-buoy, painted red* and *numbered* **2**, and placed in four fathoms of water near the western edge of Clatsop Spit. It should be left a reasonable distance on the starboard hand.

Bell-Buoy.—This buoy lies on the port side of the channel about a quarter of a mile to the southward of the remains of the wreck of the steam-ship *Great Republic*. It is a *black bell buoy*, rung by the motion of the sea, and lies one and three-quarters miles south by east three-quarters east from the Cape Disappointment Light-house. It is placed in five fathoms of water at or near the turn in the channel under Sand Island, and should be left on the port hand in entering.

In very strong ebb currents in moderate weather the sea is too smooth here to cause the bell to sound.

Clatsop Spit Buoy.—This is the next buoy to mark the channel, and the second to mark the Clatsop Spit. It is a *first-class nun buoy, painted red* and *numbered* **4**, and is placed in four fathoms of water near the northwestern point of the spit. It should be left a reasonable distance on the starboard hand in entering. It lies about one and three-eighths miles northeast (NE.) from the Red Buoy No. 2.

Sand Island Beacon.—This is a triangular beacon *painted white*, about fifty feet high and surmounted with a flag-staff. It is located on the eastern part of Sand Island, on the port side of the channel.

There are some small houses a quarter of a mile to the northeastward of it.

Clatsop Spit Buoy.—This is the third and last buoy marking Clatsop Spit and lies about one mile east three-quarters north (E. ¾ N.) from the preceding red buoy No. 4, and nearly two miles Sand Island Beacon. It is a *first class nun-buoy, painted red* and *numbered* **6**. It lies in seven and a half fathoms of water off the edge of the spit and must be left on the starboard hand in entering.

After passing this buoy the distance to the next buoy, on the port side of the channel, is two and one-eighth miles. A good range for running this part of the river is to keep the white perpendicular face of the southeast part of Cape Disappointment under the Light-house, open of the sloping base of McKenzie's Head; this will clear the lower end of the Middle ground on the river. The course of this range is east by south three-quarters south (E. by S. ¾ S.).

Lower End of Middle Ground Buoy.—This is a *first-class can-buoy, painted black* and *numbered* **5**. It is placed in three and a quarter fathoms of water at the western end of the Middle ground in the river and directly abreast Fort Stevens; and should be left on the port hand in entering. Care should be taken not to approach too close to this and the following buoys marking the southern edge of the Middle ground as it is very abrupt and partially bare at low water.

Fort Stevens Wharf Stake-Light.—This is a white stake with a box on top for a river light from which a *white light* is shown at night. It is located on the end of the wharf built out abreast of Fort Stevens, on the starboard side of the channel. The sands have formed as far out as this light-stake.

South Side of Middle Ground Buoy.—This is the second buoy marking the Middle ground and lies about two and a quarter miles east by south half south (E. by S. ½ S.) from the preceding buoy No. 5. It is a *first-class spar-buoy, painted black* and *numbered* **7**, placed in three fathoms of

water, and should be left on the port hand. The sands run dry at low water fifty yards to the northward of this buoy.

South Side of Middle Ground Buoy.—The next buoy, the third buoy marking the Middle ground, lies about one and a half miles east one-quarter north (E. ¼ N.) from the preceding black buoy No. 7. It is a *first class spar-buoy, painted black* and *numbered* **9**, placed in three and a half fathoms of water, and should be left on the port hand.

Smith's Point Stake Light.—This is a white stake and box, from which a *red light* is shown at night; it is placed on the end of the Seaside Cannery wharf, half a mile below, or to the westward of Astoria, on the starboard side of the channel. This light bears north eighty-four degrees east (N. 84° E.) four and one-quarter miles from Fort Stevens Stake-Light.

South Side of Middle Ground Buoy.—The fourth buoy to mark the Middle ground lies about one and five eighths miles northeast by east five-eighths east (NE. by E. ⅝ E.) from the preceding black buoy No. 9. It is a *first-class spar-buoy, painted black* and *numbered* **11**, placed in three and a half fathoms of water on the port side of the channel abreast the western part of Astoria.

South Side of Middle Ground Buoy.—The next buoy to mark the edge of the shoal lies only about five-eighths of a mile from the preceding black buoy No. 11. It is a *first-class spar-buoy, painted black* and *numbered* **13**, placed in twenty-two feet of water on the port side of the channel directly opposite Astoria.

Vessels should anchor in mid-channel between the two last buoys, Nos. 11 and 13.

Wreck Buoy.—In November, 1888, the wreck of the *Silvie de Grace* above Astoria was marked by a *red spar-buoy.* The first-class nun-buoy numbered 4 had been carried away by the ice.

There is at present (1886) no deep North Channel. When this channel is open it is marked by a first-class nun-buoy, painted with black and white perpendicular stripes, and placed just outside the bar at the best place of crossing. Thence the channel is usually marked by two or more black buoys to define the Peacock Spit, and which are to be left on the port hand in entering. After passing these the red buoys marking the Clatsop Spit are seen and followed.

Vessels bound to Cementville, on the north side of the river, leave the Astoria channel when past Buoy No. 6 (red), marking Clatsop Spit, and steer for Chinook Point; then follow close to the north bank of the river to Cementville.

There was formerly a deep channel into Baker's Bay running to the westward of Sand Island, and between it and Cape Disappointment, but it is now closed and the buoys removed. The present channel to Baker's Bay runs to the eastward and northward of Sand Island, and carries but eight feet of water. It is marked by spar-buoys, but it is so narrow and intricate that a pilot is needed.

SAILING DIRECTIONS FOR THE ENTRANCE TO THE COLUMBIA RIVER.

It may be taken as a general rule that at least twenty feet of water can be carried over the bar of the Columbia River; yet there have been seasons when but little more than eighteen feet have been available, and at other times fully twenty-four feet have prevailed. Sometimes there is but one bar and channel, and at other times two. The South Channel at one time lay parallel and close to the beach south of Point Adams, making it hazardous for sailing vessels to enter with the usual summer northwest winds. The North Channel sometimes is the better channel, and as it generally opens to the westward, the passage through it has been comparatively easy for sailing vessels. As a rule of the last twenty years the South Channel is the deeper and more permanent channel. At present the entrance to the river is in a transition state; the Government Engineers are constructing a jetty from the extremity of Point Adams along the line of the Clatsop Spit, hoping thereby to hold the point and direct the waters of the river so as to form but one deep channel.

Under these changing conditions it is unwise to give any sailing directions; before they could be published it is more than probable that a change in the depth of water or position of the bar would take place. The soundest advice we can give, therefore, is *when up with the bar wait for a pilot.* The establishment of a complete pilot system, with steam-tugs and one pilot-schooner cruising outside the entrance, renders it almost reckless for a stranger to enter the river, even by aid of the buoys, except in the greatest emergency. The steamers running regularly to the Columbia River always carry their bar-pilots on the vessel.

We shall confine ourselves to a few directions or advice to strangers how to find the entrance and to place themselves within reach of the assistance of the pilots.

In summer, with winds prevailing from the northwest and west-northwest, sailing vessels should work in towards the coast in the latitude of Cape Disappointment, and not fall to leeward of it; but in winter they should strive not to fall to the northward of it, because then the prevailing wind is the stormy southeaster with a heavy swell from the southwest. Moreover, if they should find themselves to the northward of the Cape, there is a littoral current moving to the northward along the shore; we have not, however, sufficient data to define the breadth of this current or its velocity under varying conditions of weather.

When the large southwest swell of the winter gales is rolling broad upon the bar and channel its character is changed for the worse by the strong ebb which carries so great a volume of water directly against it to trip it. The swell becomes shorter and sharper, frequently breaking clear over a vessel's deck and crushing everything it strikes. This local condition reaches at least as far out as the twenty-fathom depths. When the bar is breaking heavily at these times, and it is impossible to cross it, vessels that are compelled to lie to have a very rough time to the southward. Under these circumstances it is advisable to run a few miles to the north-northwest, as far as the latitude of the North Head of Cape Disappointment, where the influence of the current is hardly appreciable, and lie to in from fifteen to twenty fathoms of water. The U. S. Revenue steamer *Corwin* has laid to and sometimes anchored in this situation.

In clear weather the landfalls we have already described are very marked. Cape Disappointment, Scarborough Hill, Saddle Mountain, and Tillamook Head are unmistakable landmarks, and when these are seen, even a stranger can stand boldly in towards the entrance and heave his vessel to in the vicinity of the Whistling Buoy, taking care to note the drift of his vessel by the ranges which Tongue Point, Coxcomb Hill, or Saddle Mountain offer with the low line of the shore south of Point Adams. If the navigator is acquainted with the buoys and their general order, and the pilot should not be at hand, he may in ordinary weather venture over the bar by following the buoys, which are properly numbered and colored. But if he is not acquainted with the bar, the channel, and the currents, *wait outside for a pilot.*

When the weather is foggy, smoky, or murky the approach to the bar is a matter of great care and judgment; unfortunately the character of the entrance has acquired such a very bad reputation that many navigators are afraid to approach it, and some even keep out far beyond the cruising ground of the pilot-boats. When there is a long run of foggy weather the delay is very annoying, and yet there are guides for a nearer approach if great care be exercised in comparing the soundings obtained with those given on the chart.

The material brought down in suspension by the river is carried to and beyond the bar, and seems to be moved mainly to the northward. The result of this is that a given depth is farther off shore abreast of Cape Disappointment and Shoalwater Bay than it is to the southward as far as Tillamook Head; and because the Cape and the shore to the northward of it projects much farther to the westward than Point Adams and the shore south of it, the curves of equal depth assume a decided change of direction as they pass to the southward of the Cape. Abreast of Cape Disappointment the forty-fathom curve is eight miles off the North Head; off Leadbetter Point, twenty miles to the northward, it is probably eleven miles off shore, and the general direction of the curve is north-northwest and south-southeast. Off Point Adams the forty-fathom curve lies at a distance of nine miles from shore, but this shore is nearly six miles to the eastward of the North Head, so that between the two positions the forty-fathom line runs in a southeast by east and northwest by west direction. The thirty, twenty, and even fifteen fathom curves follow the same general direction; the fifty-fathom curve does so in a much less degree.

The general character of the bottom at fifty fathoms is gray and green mud with sand inside the forty-fathom line the bottom is gray sand, and in some places broken shells with the sand. The appearance of green or brown mud inside of forty fathoms is not at all uniform and cannot be used as a guide.

In thick weather a vessel can approach the coast, in the latitude of the entrance, with safety to within a depth of twenty fathoms of water, when she will be from five to six miles off shore if to the northward of the Cape, and from about three and a half to five miles off if to the southward of Point Adams. To ascertain her position, whether north or south of the entrance, she should steer south-southeast (SSE.) and continue sounding frequently; if she continues in the same depth of water, and is to the northward of the Cape, she will begin to deepen her water when Cape Disappointment Light-house bears northeast (NE.), distant five and a half miles, and will run into thirty fathoms and over in five miles from that point. In other words, when the

Light-house bears northeast, distant five and a half miles, the line of twenty fathoms turns to the southeast by east and continues on that course ten and a half miles, when Point Adams Light-house bears north, distant six miles, and the nearest beach is four miles off. The only case of uncertainty will be if the vessel should be nine or ten miles to the southward of the bar in twenty fathoms of water; then a south-southeast course would take her almost straight to Tillamook Rock, and the sound of the steam fog-siren would give her a certain point of departure for the bar.

Should the wind be from the southward so that the vessel can not run on a south-southeast course, and the Tillamook fog-signal is not heard, she may run in the opposite direction (north-northwest) and continue sounding as before. If she maintains the same depth for two or three miles she is to the northward of the Cape and should stand off shore and try again farther to the southward; if she is to the southward of Point Adams she will begin to shoal her water when six or seven miles south from Point Adams Light-house.

The directions are given upon the supposition that the vessel is not farther north than Leadbetter Point, nor as far south as Tillamook Rock Light-house.

If the weather should light up a little so that glimpses of the land are caught under the fog, the navigator must be on his guard and not mistake the low beach and land south of Point Adams for that of the "weather beach" between Cape Disappointment and Leadbetter Point; but even in such a case the use of the lead as suggested will be a good guide. Several vessels have been lost by mistaking the northern beach for the southern.

Steamers from the southward in thick weather make the Tillamook Rock fog-siren, and thence steer a course for the Whistling Buoy. The larger steamers carry a bar pilot and enter by the bearings of the buoys marking the bar and channel from the Whistling Buoy. Steamers from the northward can follow the twenty fathom line until they fall in with the Whistling Buoy.

The difficulty of making the bar in smoky or foggy weather, and the absence of fog-signals on the main shore, forcibly suggest the necessity for a Light-ship off the bar. Formerly there were fog-signals at Point Adams and Cape Disappointment, but they could not be heard outside the bar on account of the great noise of the breakers which frequently encircle the whole bank.

CHANNEL CHANGES OF THE COLUMBIA RIVER ENTRANCE.

The following short résumé shows the changeable character of the channels at the entrance to the Columbia River. In 1792 one broad channel and no Sand Island by Broughton-Vancouver; in 1813 when the British sloop-of-war *Raccoon* arrived in the Columbia she found the shoals off the entrance had changed considerably in extent and position from the time of Broughton. Running in on Broughton's survey she struck heavily on the bar and received considerable damage. In 1839 Belcher found two channels; in 1841 the United States Exploring Expedition found one channel. In the U. S. Coast Survey examinations of 1850, 1852, and 1868, there were two channels. In 1882 the U. S. Engineers found two channels; in 1883 they found one between the heads and three channels across the outer bank. In 1885 and 1886 they found one channel.

In the earlier surveys, and in 1851 when we were at Cape Disappointment, the North Channel was the deeper, and was used by the deep draught vessels of the Hudson Bay Company. Since Sand Island has been pushed towards Baker's Bay the North Channel, which used to pass on the north side of the Island, has been almost obliterated, and the deeper water is in the South Channel.

THE TIDES AT THE MOUTH OF THE COLUMBIA RIVER.

At Astoria the Corrected Establishment, or mean interval between the time of the Moon's transit and the time of high water, is XII^{h} 45^{m}. The mean rise and fall of tides is six and two-tenths feet; of spring-tides, seven and six-tenths feet; and of neap-tides, four and eight-tenths feet. The mean duration of the rise is 6^{h} 01^{m}; of the fall, 6^{h} 21^{m}; and of the stand, 0^{h} 33^{m}. The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is 1^{h} 02^{m} for high water, and 0^{h} 52^{m} for low water; the differences when the Moon's declination is greatest are 1^{h} 38^{m} and 1^{h} 15^{m} respectively. The average difference in height of those two tides is one and four-tenths feet for the high waters, and two and three-tenths feet for the low waters. When the Moon's declination is greatest those differences are one and nine-tenths feet and three and seven-tenths feet respectively. The average difference of the higher high and lower low waters of the same day is seven and nine-tenths feet, and when the Moon's declination

is greatest eight and nine-tenths feet. The higher high tide in the twenty-four hours occurs about $12^h\ 11^m$ after the Moon's upper transit (southing) when the Moon's declination is north, and about $0^h\ 15^m$ before, when south. The lower of the low waters occurs about seven and a half hours after the higher high water. The greatest observed difference between the two low waters of one day was five and one-tenth feet, and the greatest difference between the higher high and lower low waters of one day was eleven and one-half feet.

The two tides of the same day are generally unequal in proportion to the Moon's declination. The time and height can be obtained approximately from the following table:

Place.	Moon's Declination.	Moon's Southing.				Moon's Northing			
		High Water.		Low Water.		High Water.		Low Water.	
		Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
		h. m.	*Feet.*	*h. m.*	*Feet.*	*h. m.*	*Feet.*	*h. m.*	*Feet.*
Cape Disappointment	Greatest North	12 04	7.9	19 13	0.7	13 18	6.1	18 32	
	Zero	11 43	7.2	17 56	+0.8	11 43	7.2	17 56	
	Greatest South	13 18	6.1	18 32	+2.9	12 04	7.9	19 13	
Fort Stevens	Greatest North	12 10	8.0	19 24	—0.4	13 30	6.2	18 30	
	Zero	12 00	7.6	18 18	+0.6	12 00	7.6	18 18	
	Greatest South	13 30	6.2	18 30	+2.6	12 10	8.0	19 24	
Astoria	Greatest North	12 05	8.3	19 41	—0.4	13 24	6.7	18 36	
	Zero	12 43	7.7	19 13	+0.8	12 43	7.7	19 13	
	Greatest South	13 24	6.7	18 36	+2.8	12 05	8.3	19 41	

The "interval" given above is to be added to the time of the Moon's transit for any required day to give the time of high or low water for that day. The time of the Moon's southing, or upper meridian transit, is given in the Nautical Almanac and in the Tide Tables for the Pacific Coast; and the time of its northing, or lower transit, is the middle between two upper transits. The heights are given in feet and tenths and show the rise above the level of the average of the lower low waters, which is the plane of reference to which the soundings on the chart have all been reduced.

Spring-tides.—At the full and change of the Moon the high waters will be eight-tenths of a foot higher than the tabulated figures at each of the three stations; and the low waters one-half of a foot lower.

Neap-tides.—At the Moon's first and last quarters the high waters will be eight-tenths of a foot lower than the tabulated figures at each of the three stations; and the low waters will not fall so low by one-half of a foot.

The general experience at the bars of the North and South Channels is that the tide makes nearly fifty minutes earlier than at Astoria.

The Pacific Tide Table of the U. S. Coast and Geodetic Survey is published annually. It gives the time and height of every tide throughout the year.

When the self-registering tide-gauge of the U. S. Coast and Geodetic Survey was in operation at Astoria for more than twenty years, it was constantly consulted by the pilots and ship captains to learn the condition of the bar, because by its peculiarity of registration the traced line exhibited the smoothness or roughness of the bar. Since the discontinuance of this gauge another, owned by private individuals, has been established for the purpose of indicating the condition of the bar.

The Columbia River was called the "Oregon," from the mere mention of that name, by Colnett, in 1766. Much doubt exists as to the origin of the name.

In August, 1775, Don Bruno de Heceta named the entrance, which he supposed was a bay or river, the Boca de la Asuncion or the Strait of Heceta. (See Cape Disappointment.)

In July, 1788, Meares named it Deception Bay. (See Cape Disappointment.)

In 1792 it was named Columbia's River by Gray, who commanded the American ship *Columbia*.

In the same year Broughton, who made the survey of the river to Fort Vancouver, says:

> The discovery of this river we were given to understand is claimed by the Spaniards who called it "Entrada de Ceta," after the commander (Heceta) of the vessel, who is said to be its first discoverer but who never entered it: he places it in 46°.

Later in 1792 Vancouver refers to the discovery by Gray of the river and harbor named Columbia, and on the chart of Broughton it is named Columbia River, and on the general chart The Columbia River.

In January, 1806, Clarke says that the Indians called the river the Shocatilcum; while another name obtained from another body of Indians was Chockalillcum; the two are evidently the same combination of words (Shocatillicum) differently pronounced. The accent should be on the penult of Shocatilcum.

In De Mofras' chart of 1844 he calls it R^o S^o Roque, Orégon ou R^r Colombia. (Heceta, 1775.)

The Beach North of Cape Disappointment.—A narrow-gauge railroad has been completed from Ilwaco, on Baker's, Bay to the ocean beach north of Cape Disappointment and thence northward to Naratta, a distance of sixteen miles.

It connects all the summer resorts along the beach, and at Naratta a wharf six hundred yards long is projected from the Shoalwater Bay shore to the deep-water channel.

PILOT LAWS FOR COLUMBIA BAR AND RIVER.

The pilotage law of Oregon, as amended in February, 1889, is as follows:

SECTION 3918. The compensation allowed for piloting a vessel upon or over the bar pilot-ground is: For piloting an inward or outward bound vessel to or from Astoria over the bar, or from within the bar to the open sea, four dollars for each foot of draught of the vessel, and two cents a ton for each ton over one thousand tons registered tonnage; from or within the bar and below Sand Island, one half of that rate; and from or above Sand Island, one-quarter of that rate.

SEC. 3919. The compensation for piloting a vessel upon the river pilot-ground between Astoria and Portland, whether going up or coming down the river, is two dollars for each foot of draught of the vessel, and two cents for each ton over and above one thousand tons register, which sum shall include services of the pilot in taking the vessel to and from the dock to which the vessel is destined. The Board of Pilot Commissioners is authorized to prescribe a proportionate compensation for pilot service between other points on said ground, and for moving a ship in port from one dock to another, or from one part of a dock to another part of the same dock; the charge therefor shall be a sum not exceeding five dollars, and the pilot shall, on being thereunto requested by the master of a ship, be required to do such work, and for such compensation. Every river pilot appointed and qualified under the provisions of this act, is required to render his services promptly for the compensation provided by law in piloting any vessel up or down the Columbia or Willamette Rivers when requested by the master of such vessel. If a river pilot shall speak a vessel as herein provided, and the services of such pilot or some other river pilot licensed under this act, selected by the master of such vessel, shall be rejected by such master, the pilot first speaking the said vessel shall be entitled to half pilotage, to be recovered of said master or vessel.

SEC. 3920. The pilot who first speaks a vessel not exempt from compulsory pilotage, as provided by section 3917, or duly offers his services thereto, as a pilot, on or without the bar pilot-ground, is entitled to pilot such vessel over the same. The master may decline to accept the services of any pilot, and may navigate his vessel over said pilot-grounds without a pilot, but nevertheless he shall, if inward bound, pay to the pilot who first speaks his vessel one-half of the amount of pilotage to which said pilot would have been entitled if his offer had been accepted and the services performed accordingly, and if outward bound the master may contract with any bar-pilot licensed under this act.

A vessel is exempt from compulsory pilotage and not required to pay a pilot unless one is employed (1) when she is engaged in the whaling or fishing trade; (2) when she is licensed and engaged exclusively in the coasting trade between any port in Oregon and any port of the United States on the Pacific Coast.

Ship masters may reject the services of river pilots without incurring compulsory pilotage.

VESSELS IN DISTRESS OFF COLUMBIA RIVER BAR.

Section 3912 says that "the pilot schooner [*Governor Moody*] belonging to the State of Oregon shall be under the direction and control of the Board of Pilot Commissioners, who shall establish rules and regulations for the use thereof." "Said schooner shall be kept cruising at all times outside the Columbia River Bar, with bar-pilots on board, unless prevented by tempestuous weather; and said schooner shall at all times, and at the expense of the pilots, carry such sufficient

supply of provisions and water as may be necessary for the relief of vessels in distress, and such pilots must at all times extend aid to all vessels in stress of weather or in case of disaster; * * * *Provided*, That this section shall not affect any claim for salvage arising out of services involving extraordinary danger or risk."

WASHINGTON PILOTS FOR THE COLUMBIA RIVER.

The existing pilotage laws of the Territory of Washington authorize the following compensation for piloting vessels between the sea and Astoria:

Eight dollars per foot for the first twelve feet of draught, and ten dollars per foot for each additional foot or fraction thereof; and for piloting a vessel on the Columbia River between Astoria and Portland, four dollars per foot draught.

The Washington law further provides for compulsory half pilotage. A pilot holding a branch from the Washington Pilot Commissioners, upon speaking a vessel, can demand half pilotage at the above rates even if his services be not accepted.

This law may be amended when Washington Territory becomes a State in 1889.

PILOTAGE AND TOWAGE COMBINED.

The Oregon Railway and Navigation Company has announced the following rates for pilotage and towage of vessels from the sea to Portland and return, and guaranties that the same shall not be increased for a period of two years from May 21, 1889, the date upon which the law became effective:

Vessels not exceeding 800 tons register	$450
Over 800 tons to 1,200 tons	500
Over 1,200 tons to 1,600 tons	550
Over 1,600 tons to 2,100 tons	600
Over 2,100	special.
Use of tug's hawsers (each way)	20

Lighterage upon grain and its products from Portland to Astoria, 50 cents per ton of 2,000 pounds. Lighterage upon other freight $1 per ton, weight or measurement at option of the company. Moving a vessel in port, $10

(The above rates are obtainable only upon the express condition that vessels are towed by the tugs and tow-boats owned by that company, and piloted by pilots in its employ.)

So long as this law and this schedule are in operation a vessel has less expense by the employment of the company's boats and pilots.

SHOALWATER BAY.

The Peninsula.—The bold cliffs of Cape Disappointment, after extending two and a half miles to the northwest, change suddenly to a low, broad, sandy beach running in an almost straight line north twenty-three and a half degrees west (N. 23½° W.) for nineteen and a half miles to the southern point of the entrance to Shoalwater Bay. The recession from the straight line is barely half a mile to the eastward. This beach is known as the "Weather Beach," and is the ocean front of the Peninsula, which is the western shore of Shoalwater Bay, and which has an average width of one and a half miles to Leadbetter Point.

The peninsula is a long, low, flat, and sandy strip, elevated but a few feet above the ocean; it is marked by long, sandy ridges reaching a little over twenty feet elevation, and lying parallel with the ocean shore-line. In the long depressions between these sand ridges are many miles of narrow marshes and lagoons. This peninsula is covered, as is the entire surface of the country, with a dense growth of gigantic forest trees, principally spruce, fir, and cedar, with a few specimens of maple, ash, and black alder. The spruce frequently attains a diameter of eight feet. Just inside the ocean beach there is a narrow border of sandy soil in ridges reaching over twenty feet high, covered with coarse grass, and suddenly changing to the dense forest.

About four and a half miles northward from the Cape there is a series of marshy places across the peninsula where fires have destroyed the forest so as to leave gaps of scattering trees. This break in the forest line is a notable feature. There is another but very slight break farther to the northward. With these exceptions the peninsula carries its forest well to the northern extremity. Under this dark line of trees the white sand of the broad beach is very distinct and bright.

About half-way along the peninsula low sand dunes form in front of the forest, in a narrow

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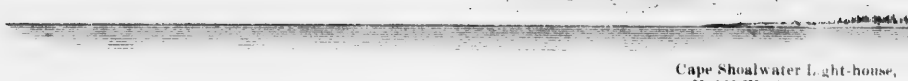
Cape Shoalwater Light-house, E. ¼ S., 5½ miles. Goose Point. Wreck. Leadbetter Point (wooded part), SE. ¼ E., 11½ miles.

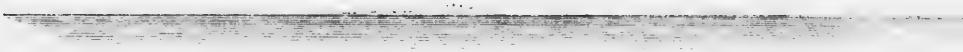
Hawks Point. Range Point. Goose Point. Outer buoy. Leadbetter Point (wooded part), N. 68° E., 5½ miles.

Two views of Shoalwater Entrance when outer buoy bears NE. by E. ¼ E., 1½ miles.

Point Hanson. Cape Shoalwater Light-house, N. by E., 8 miles. Wreck.



Cape Shoalwater Light-house,
N. 13° W., 14¼ miles.



Cape Shoalwater Light-house, N

Cape Sh
E. by N.

Cape Shoalwater Light-house, N. 13° W., 14¼ miles.

Leadbetter Point (wooded part), N. ¼ E., 8 miles.

Cape Shoalwater Light-house, N. ¼ W., 9¼ miles.

Leadbetter Point (wooded part), N. 38° E., 4½ miles.

Cape Shoalwater Light-house, E. by N. ½ N., 4½ miles.

Range Point.

ne at first but gradually increasing in breadth until within two and a half miles of the point here these dunes reach clear across and the trees cease on the bay shore.

A little north of Cape Disappointment there is a cluster of houses just back from the beach; and five or six miles farther north there is another cluster of houses. These are the only houses visible from seaward along the whole line of the peninsula (1885).

Along the seaward face of this peninsula the depth of water is ten fathoms, over fine gray sand, at an average distance of two and a half miles from shore. The twenty-fathom depth is at five to five and a half miles, over fine gray sand and mud, up to latitude 46° 30′. The line of forty fathoms is eleven miles from shore, over dark-gray sand and brown mud.

Leadbetter Point.—The entrance to Shoalwater Bay is about two and a half miles wide between low sand points on the north and south sides.

The southern side of the entrance is Leadbetter Point, which is the northern and bare extremity of the peninsula just described. It is a low point of sand dunes, unmarked by trees or bushes, and has coarse grass only in a few places. It curves inward towards the northeast about one and a quarter miles from the general line of the weather beach. The northernmost part of the point bears north nineteen degrees west (N. 19° W.), distant twenty-one miles from the North Head of Cape Disappointment.

It has no distinctive mark to indicate its position nearer than the northern extremity of the trees on the bay shore of the peninsula, two and one-third miles from the entrance to the bay. This limit of the trees is a little over a mile inside of the outer beach, and in latitude 46° 36½′. It bears south thirty-three degrees east (S. 33° E.) distant six and three-quarters miles from Cape Shoalwater Light-house.

As changes are continually taking place in the channel or channels leading into the bay, so does the point change somewhat its outline. In 1852 the low, sandy point beyond the trees extended only half a mile to the northwestward; but for two miles farther northward there were large areas bare at low water. Before the survey of 1871 these bare places were connected with the fixed point to the southward, and the point actually reached two miles farther to the northward, thereby decreasing the width of the entrance at high water by that much. It was then reported to be formed of loose sand which drifts and changes with every wind.

The approximate geographical position of the extremity of the point, as it existed in 1875, was:

Latitude	46° 38′ 37″ north.
Longitude	124° 03′ 00″ west.

This point was called Low Point by Meares in July, 1788. It was named Leadbetter Point by the U. S. Coast Survey in 1852, and has retained this name. The Indian name of the peninsula is Tee choots.

CAPE SHOALWATER.

This is the northern point of the entrance to Shoalwater Bay. It is a low point, covered in part with trees, but consists of bare sand south of the Light-house. When seen from seaward the line of woods stretches to the northward, and this and the extreme point are projected against the higher wooded lands beyond the bay. Immediately to the northward the wooded hills are comparatively close; but when the Light-house bears east by north it is projected on the more distant hills.

When the Cape is seen from the south by east half east, at a distance of twenty-two miles, only the tree tops on the higher part of the point are visible, and the trees on Leadbetter Point are a little better seen. Cape Shoalwater is the westernmost land visible, but its inner part and Leadbetter Point are projected on a low line of distant hills.

When the Cape bears north by west, distant fifteen miles, it is projected on the high land beyond which fades out as a low point a little westward of the Cape.

When the Cape bears east by south, distant five or six miles, it shows as a low point with a white sandy beach line and a dark line of bushes apparently from the Light-house to the higher forest line northward. This dark line of bushes is really the tops of trees on the low land back of the sand ridge upon which the Light-house is located. A low line of trees, like an island, shows well in the bay farther to the southeast; this is Goose Point at the mouth of the Palux River. Leadbetter Point is seen only at the point of the trees.

When Cape Shoalwater Light-house bears about southeast by east half east, and distant nine miles, the long low sand point to the southward of the Light-house is not visible, but the Cape

shows as a rather long, bare, sandy point, slightly higher at its southern extremity where the Light-house is situated; and this point is projected on the distant mountains to the eastward of Shoalwater Bay. Just to the northward of the bare sand ridge are the trees on the [illegible] land between it and the higher wooded land to the northward of Cape Shoalwater; the extremity of this higher land shows as a round hill with a saddle behind it.

The Light-house at Cape Shoalwater bears north thirty-nine degrees west (N. 39° W.) [illegible] four and a half miles from the extremity of Leadbetter Point, and stands on the southern [illegible] of a sand ridge about fifty feet high; but it is nearly two miles from the end of the [illegible] point which stretches thence towards Leadbetter Point. This sand point is one of two long, [illegible] points, south and east of the Light-house which look as if they were dragged into the bay by the force of the wind and water.

Northward from the Light house there is a stretch of low sand dunes, half a mile wide, between the beach and the trees. This width decreases gradually towards Gray's Harbor, and at its narrowest part is about two hundred and fifty yards wide.

The sandy projection from the extremity of the trees on Leadbetter Point and that from Cape Shoalwater contract the entrance to the bay to two and a half miles; but this width can not be relied upon because each point of the entrance is subject to frequent and irregular changes. In 1885 there was a long shoal extending three and three-quarters miles directly south from the extremity of Cape Shoalwater, where its breadth was over two miles. The tail of this shoal was nearly as far south as the extremity of Ledbetter Point, and the channel to the bay ran under the eastern side of the shoal on a course north by east.

There has been an opinion that the appearance of the approaches to Shoalwater Bay are very similar to those at the Columbia River, but we have been unable to detect any resemblance after passing near it several times. The isolated position of Cape Disappointment, its height, and the seaward face of its bold, rocky cliffs without trees form a peculiar feature. This with Scarboro Hill, the half-cleared top of Coxcomb Hill, Saddle Mountain, and Tillamook Head, should remove all doubt in regard to the general resemblance. Moreover, the difference in latitude is [illegible] miles. It is claimed that in thick weather, when the high land is covered with haze, smoke, or fog, the long line of low beach to the south of the entrance to Shoalwater Bay resembles [illegible] Clatsop Beach; and then the higher wooded part of Cape Shoalwater may be mistaken for Cape Disappointment. In support of this explanation we have the reports of several vessels actually entering to enter the bay under the misapprehension that it was the Columbia, and that others have been wrecked on the North Breakers. The explanation is unsatisfactory, and a navigator who does not know the coast, or his position closely, should certainly use the lead in approaching what he considers the Columbia River.

THE LIGHT-HOUSE ON CAPE SHOALWATER.

This is a secondary sea-coast light. The Light-house at this point is situated two-thirds of a mile inside the ocean beach at the commencement of the fast land, at the highest part of the sand dunes, and clear of the trees from the northward. It lies twenty-five and a quarter miles from twenty-four degrees west (N. 24° W.) from the North Head of Cape Disappointment.

The structure consists of a keeper's dwelling, with a tower rising through it and surmounted by an iron lantern painted black. The tower is the frustum of a cone. The dwelling and [illegible] are plastered and whitewashed, but are not conspicuous objects. The illuminating apparatus is of the fourth order of the system of Fresnel and shows *a fixed white light varied by a white flash every two minutes.* It illuminates the entire sea and bay horizon, but there are no catadioptric lights towards the forest. It was first exhibited on October 1, 1858, and shows from sunset to sunrise. The height of the focal plane is thirty-five feet above the ground and eighty-five feet above the mean level of the sea. In favorable conditions of the weather the light should be seen from a height of

10 feet at a distance of 14 miles.
20 feet at a distance of 16 miles.
30 feet at a distance of 17 miles.

The geographical position, as determined by the U. S. Coast and Geodetic survey, is:

Latitude	46	43	00″	north
Longitude	124	04	25	west
Or, in time	8h	16m	17s.7	

The magnetic variation was 21° 58′ east in January, 1885, with a yearly increase of 1′.8.

The light at Cape Shoalwater was discontinued September 1, 1859, and relighted in the early part of July, 1861.

From Cape Shoalwater Light-house we have the following bearings and distances to important objects:

Cape Orford Light-house	S. 17½°	E.	234 miles.
Cape Gregory Light-house	S. 19°	E.	202 miles.
Yaquina Heads Light-house	S. 22½°	E.	122 miles.
Tillamook Rock Light-house (not intervisible)	S. 25°	E.	48 miles.
North Head of Cape Disappointment	S. 22°	E.	25¾ miles.
Destruction Island (proposed site of Light-house)	N. 38½°	W.	58½ miles.
Jagged Islet and Carroll Rock near Cape Johnson	N. 40½°	W.	82 miles.

The course of the steamers between San Francisco and the Strait of Fuca is about thirty miles outside of Cape Shoalwater, and the Light therefore is not visible, but the high mountains on the east side of the bay are seen.

Life Saving Station.—A first-class life-saving station, with complete apparatus and crew always on duty, is located near Cape Shoalwater on the north shore of Light-house Cove.

The point was named Cape Shoalwater in July, 1788, by Meares, who placed it in latitude 46° 47′. In 1792 Vancouver assigned to it the latitude 46° 40′. It was viewed from the northern part of Cape Disappointment by Lewis and Clarke in 1805, and was called Point Lewis. In the first survey of 1852 it was named Toke Point from an old Indian chief; but this name is now applied to the low point inside the bay four and a half miles eastward of the Light-house. The Indian name of the point is Qualapt-sum.

General Description of Shoalwater Bay.—Inside of the long peninsula the bay stretches south-southeast for eighteen miles from mid-entrance, with an average breadth of four miles. The shores are generally low. Immediately abreast the entrance the northern part of the bay runs east-northeast, square in from the coast line, for ten miles to the foot of the wooded highlands between which empties the Whilapa/h River. The north shore is very irregular and broken into several minor bays which receive small streams from the north.

The bay, as its name implies, is so full of shoals that at low water about one-half of its area is laid bare. The great shoal immediately inside the entrance stretches two miles northward from Leadbetter Point. The shoals were formerly covered with shell-fish among which the oyster was the most abundant and the principal article of export. The native oysters are small and have a coppery taste. The supply had been nearly exhausted, in part on account of some disease; but care is being exercised in their cultivation, and the supply is recovering. Fish of all kinds abound, and formerly the wild fowl from the north covered the waters of the bay and all the streams and marshes.

The part of the bay north of the line from Leadbetter Point to Goose Point is locally known as the North Bay, and the rest to the southward as the South Bay.

The shores of the bay, with the exception of the peninsula side, are mostly composed of low banks of a sandy clay in which are strata of recent fossil shells and the remains of trees. Where these banks are washed by the waters of the bay they have nearly vertical cliffs and are covered on top with a dense growth of firs and underbrush to the edge.

The eastern shore of the Bay, from Goose Point round to the Nemur Rivers, is a level table-land covered with trees, and noticeable with its bright washed cliffs. The double point just west of the mouths of the rivers forms two very conspicuous, steep, bright cliffs, wooded on top; and on the extreme point is a second growth of forest trees. Between the Nemur and the Násal Rivers there are also a few bright cliffs, noticeably about two miles south of the former rivers, and another just northwest of the mouth of the Násal River. But the land is hilly near the shores, and rises quite high on the north side of the mouth of the latter river.

The entire country surrounding Shoalwater Bay is densely forested, and from its shores there has been taken the largest and clearest of all the northern firs for lower masts to the great clipper ships in the California trade.

Several streams enter the bay, and there are good but narrow channels throughout its extent leading from them. At low water these channels are all clearly defined by the shoals on either side, and the currents then run with great velocity and it is difficult to keep a course against them. The streams are all of limited extent. The principal one empties into the northeastern angle of the bay, and is called the *Whil-a-pah.** The mouth of this river lies exactly ten miles east by

* The Whil-a-pah Indians are extinct. The true name is Ah-whil-a-pah or Ah-whil-lapsh.

north half north (E. by N. ½ N.) from Cape Shoalwater Light-house and nine and a half miles northeast by east (NE. by E.) from the first red buoy in the entrance to the bay. At a [illegible] miles back from the shore to the northward of the river the ridge of high wooded land runs northwest and southeast, and shows six or more weakly defined hill-tops from one thousand to thirteen hundred feet in height to break its outline. The extreme end of Range Point, on the south and west side of the river's mouth, is low and marshy and is not seen until a vessel is close to it. The river at its mouth is less than a quarter of a mile wide, with low, marshy banks. The marsh land, through which the river comes, is about a mile and a half wide between steep, heavily forested hill-sides. It is reported that the river is navigable for vessels drawing twelve feet for ten miles from its mouth.

On this river are the villages of South Bend, Riverside, and Woodward's Landing. Woodward's Saw-mill is at South Bend, and when this and the mill on Nasal River are running they ship five or six cargoes per month. The channel from the Whil-a-pah is known to navigators as the North Channel, and carries three fathoms of water from its mouth.

The mouth of the *Palux River*, just to the eastward of Goose Point, is really an estuary three-quarters of a mile wide to the small stream which comes through low, marshy lands among the hills. The mouth is marked by Goose Point, which lies four miles north seventy-seven degrees east (N. 77° E.) from Leadbetter Point.

In an indentation of the east shore of the bay, bearing east from Oysterville, empty two small streams called the *North* and *South Nemar Rivers*. The double point at the west side of the little bay is four and three-quarters miles south eighty-seven degrees east (S. 87° E.) from the outer end of the wharf at Oysterville.

The *Nasal River* enters in the southeastern part of the bay behind Long Island. The mouth is half a mile wide and apparently blocked by a projection from Long Island. The channel leading to it carries not less than three fathoms, and at the mouth there is a depth of twenty feet. There are high, wooded banks on either side of the river, but where these spread apart the country is filled with flats and marshes. There is a saw-mill on the Nasal; it is visible from the anchorage off Oysterville. The mouth of the river is six miles southeast by east (SE. by E.) from the outer end of the Oysterville wharf.

A few small streams enter the south part of the bay, and two of them reach near to Baker's Bay, on the Columbia River, affording good portage thereto.

The north shore of the bay is very irregular and is divided into three small bays by the projections of Hawks Point and Toke Point. The easternmost of these indentations, near the Whil-a-pah, is at high water one and one-half miles wide and nearly that distance into its head. It has high, wooded shores. Into the northeastern angle of this bay empties the *Necomanche*, known as the *North River*. It has six feet of water in a channel under the west shore of the bay. The bends of this river come quite close to some of the tributaries of the Chehalis River entering into Gray's Harbor.

Into the middle cove, between Hawks Point and Toke Point, empties a small stream called the *Cedar River*.

The westernmost indentation of the north shore, generally called the *Light-house Cove*, has a stream emptying into it. At the head of the cove, under the high, wooded shore, is seen a group of houses; this is the village of the Indian Reservation. A good channel leads into the cove, branching to the northward from the main channel when nearly up with the black buoy marking the Jenny Ford Spit. The Light-house steamer anchors in this cove when supplying the station. It is a very snug and well-protected anchorage. The life-saving station is situated on the north shore of this cove.

There are several *islands* in the Bay.

Pine Island lies one and one-third miles southwest one-third west (SW. ⅓ W.) from Goose Point, and one and two-thirds miles north by west half west (N. by W. ½ W.) from Goose Point. It is a small sand islet, four or five acres in extent, covered with low, stunted fir trees and coarse grass. It is in the middle of the extensive oyster beds in this part of the bay. The Indian name of the island is Nass-too.

Westward of Pine Island there is a low, sandy island called *Snag Island*. It is in the direction of the long, bare, sandy flat of the survey of 1852. On this flat, which is on the south side of the north channel, are two bare ridges, one known as the *Ellen Sands* to the westward of Snag Island, and the other, *Sands* between Snag Island and Goose Point.

The southern part of the bay is largely filled by *Long Island*, the largest island in the bay. Its northern end is in the middle of the bay, nine and one-third miles southeastwardly from Leadbetter Point. The island is five and a half miles long, northwest and southeast, and averages about one and a half miles broad, with very irregular outline and generally high shores. It lies nearer the eastern shore of the bay and directly opposite the mouth of the Násal River. There is a narrow and shoal channel between it and the eastern shore; but the main channel, between it and the western shore, carries four to six fathoms of water. The north end of the island rises almost directly to a height of two hundred and twenty feet; and at about midway there are two hills reaching two hundred and forty feet; the southern end is about one hundred feet in elevation. Its entire surface is covered with a dense growth of forest and underbrush. From seaward the island is readily seen over the forest of the peninsula.

One mile southward from Long Island is a very small islet called *Round Island;* it rises to a height of sixty feet and contains only a few acres of land, formerly covered with trees and bushes. There is a narrow three-feet channel on the west side of this islet.

In 1852, at the time of the first survey, there was an island in the entrance, between Cape Shoalwater and Leadbetter Point, but rather inside the line joining them. It was called Sand Island, and was covered with coarse grass. From the outer side of this island extended the Middle Sands, which divided the entrance into a North Channel and a South Channel. In 1855 this island had disappeared and a moderately large area, bare only at low water, was in its place, but the Middle Sands remained. In the survey of 1871, there was a depth of a fathom or more of water where Sand Island formerly existed. To the southeastward and just under the hook of Leadbetter Point there were at that time two areas of sand exposed at high water and separated from the point. These were called Log Island and Crescent Island.

Points in the Bay.—In the northern part of the bay there are several points frequently referred to in the buoy-list and by navigators.

Shoalwater Points.—This name is applied as characteristic to the two long, low, sandy points stretching eastward from Cape Shoalwater. These two points are long arms of sand dragging into the bay in a general easterly direction. The outer one is two miles long from the curve at the outer beach, and its direction is nearly east by south. The extremity is one and four-fifths miles southeast by east from the Light-house. The second point lies roughly parallel and to the north of the outer one. The Light-house Cove lies to the northward of the second point, between it and still another low, projecting point to the northward, which latter point is covered with grass and trees. It is a very snug and well protected anchorage in soft mud. The life-saving station is located on the north shore of this cove.

The two outer points are subject to great and frequent changes. In 1852 and 1855 they did not exist, but a beginning was indicated. In 1871 they were fully developed. There is no vegetation upon them.

Toke Point.—This is a long, low tongue of land stretching eastwardly from the north shore. It leaves that shore about two and a half miles east-northeast from the Light-house, and stretches into the bay two and a half miles with an average width of half a mile. Near the main shore it is low, marshy, and treeless; thence for about one and three-quarters miles it is covered with low trees and bushes to its extremity, which is low and sandy. The extremity of the point lies four and a half miles north seventy-nine degrees east (N. 79° E.) from the Light-house, and four and four fifths miles north nineteen degrees east from the Leadbetter Point. The main shore retreats nearly two miles to the north of Toke Point, and in the deepest part of the bight is the mouth of Cedar River, already referred to. Toke Point does not show conspicuously from outside the bar, the tree-covered portion of it being projected against the higher land of Hawks Point just to the northeast; and the bare extremity is not seen until a vessel is abreast the second red buoy, well inside the entrance.

In 1852 the name Toke Point was erroneously applied to Cape Shoalwater. Toke was an old Indian chief who lived on this point, or in its vicinity.

Hawks Point is on the north shore of the bay, and is fronted on the south by a broad area of shoals bare at low water. On its eastern side there is a six-feet channel leading into the North River Bay. The point is a moderately high bluff covered with trees. It lies six and two-thirds miles north sixty-eight degrees east (N. 68° E.) from the Light house, and seven and one-third miles north twenty-six degrees east (N. 26° E.) from Leadbetter Point. The mouth of the Whil-a-pah lies three and a half miles east from Hawks Point.

Range Point.—This is the point on the southwest side of the mouth of Whil-a-pah River. It is a moderately narrow tongue of forest covered fast land, from eighty to one hundred feet high, projecting from the southward. It is bordered by a belt of low marsh, from three hundred to five hundred yards in width, but this low border is not seen until a vessel is nearly up with the point. The high part of the point is a conspicuous object when broad off the entrance to the bay, and was used as a range mark for crossing the bar in former years when the North Channel existed, hence its name. The high extremity of the point lies nine and a half miles north seventy-four degrees east (N. 74° E.) from the Light-house, and nine miles north forty-eight degrees east (N. 48° E.) from Leadbetter Point.

Stony Point is a sharp, narrow cliff of sandy clay, sixty feet high, making out four hundred and fifty yards directly west from the moderately high land on the southeast side of North Bay. It is rapidly wearing away, this has exposed at its base the underlying stratum of bowlders of basaltic rock. It is said that no other place on the bay presents this geological feature. Stony Point is not conspicuous from outside the entrance, being projected against the ridge terminating in Range Point. It lies six and three quarters miles south eighty-eight degrees east (S. 88° E.) from the Light-house, and five and a quarter miles north forty-nine degrees east (N. 49° E.) from Leadbetter Point. Pine Island lies one and one-third miles outside the point on the bearing to Leadbetter Point. The town of Bruceport is located three-quarters of a mile northeast from and inside of Stony Point.

Goose Point.—This is a ragged, bluff, and wooded point, about fifty feet high, with bright, low cliffs, at the west side of the entrance to the Palux River. From outside the bar it shows conspicuously over the bare part of Leadbetter Point. There is a low, marshy neck a quarter of a mile south of the extremity of the point, and the trees for a short distance towards Sandy Point have been cleared away, so that Goose Point is first made as a small island, somewhat resembling Tongue Point in the Columbia River. The whole of the peninsula southeast of the point is a series of wooded hillocks nearly cut through by marshy sloughs; but the overlapping of these hillocks gives a general impression of a level, wooded ridge.

Goose Point lies seven miles south sixty seven degrees east (S. 67° E.) from the Light-house, and three and three-quarters miles north seventy-seven degrees east (N. 77° E.) from Leadbetter Point.

Sandy Point is a low sand point making out nearly one-third of a mile from the wooded land behind it. It is a rather long, curving point two miles south-southeast from Goose Point, and four and a half miles south seventy six degrees east from Leadbetter Point.

There are several settlements in Shoalwater Bay. The Saw-mills already mentioned; Bruceport on the east side of the bay near Stony Point, with the great oyster beds lying in front of the place; Bay Centre, near Goose Point at the mouth of the Palux; and numerous settlers around the bay and on the different streams.

Oysterville is the largest settlement on the bay. It is located on the bay shore of the long peninsula, about six miles in a straight line from the present extremity of Leadbetter Point. There are very extensive oyster beds between the shore and the main channel, which runs through the middle of the bay on a south-southeast course nearly to the head. A wharf seven feet wide with a T eighty feet long at the outer end, has been built out from the shore to reach deeper water. This wharf is over half a mile long. The main channel does not lead by the wharf, but a short arm comes in from the southeast and small vessels can enter this and come up to the wharf. Larger vessels anchor in deep water about two miles broad off the town. Large areas of the flats in this vicinity are partially bare at low water.

SAILING DIRECTIONS AND AIDS TO NAVIGATION.

The approaches to the entrance of Shoalwater Bay are shoaler than to any other bay on the coast. The surveys which have been made since that of 1852 clearly exhibit this feature, and demonstrate the frequent and great changes which take place in the shoals through which the channel or channels pass. Four miles off the entrance the line of ten fathoms is found; then seven fathoms, over a bottom of fine gray sand at five miles; and forty fathoms, over dark mud and sand, at twelve miles. In less heavy weather than would cause the sea to break on the Columbia River bars, it breaks here with fury quite around the entrance. At present the great shoal barring the entrance makes out to the southward from Cape Shoalwater for three and a half miles, and a long lines of breakers mark its southward limit. The inner edge was in 1885 marked by three wrecks

There have been two channels into the bay, and sometimes only one; and the survey of one season is useless as a guide for the next. In view of these facts it is useless to give definite sailing directions. The approaches and the entrance are marked by a good series of buoys, which are changed by the Light house Board to conform to the changes in the channels, and vessels may enter and leave by these buoys. In the approaches and the main channel there are sufficient buoys to guide a vessel. When vessels are running by the buoys as guides, they must watch the set of the currents, because at certain stages of the tides they run with great velocity, and at times run across the shoals.

In 1885 there was a depth of sixteen feet of water on the bar, and the course over the bar and along the inside of the line of breakers on the spit reaching out from Cape Shoalwater was about north by east, so that a sailing vessel could enter without tacking in ordinary summer winds.

In January, 1888, the report of the hydrographic examination of the entrance to this bay showed that changes had taken place and were then taking place. At that time there was but one channel into the bay. Vessels drawing eighteen feet of water could enter at any stage of the tide, but *strangers should never attempt to cross the bar without a pilot.* The middle sands were gradually shifting to the southward, and the north or "swash" channel was deepening. Vessels could anchor anywhere inside the points of entrance, but the safest place was North Cove, which is perfectly protected from the sea, and where good holding ground can be found.

The bay is rarely visited by any other vessels than those engaged in the lumber traffic, and these, as a general rule, proceed directly to the mills on the Whilapah or Nasal Rivers. About one hundred vessels, averaging three hundred tons each, enter the bay annually.

The *tidal currents* are very strong, and a velocity as high as three and a half knots was observed during the season. The set is across the channel.

There are ranges in use by pilots, but they are changed to suit the changes of the bar.

At that time the directions for approaching the harbor were to bring the Light-house to bear north one-quarter east until up with the outer bar buoy. But as the buoys are changed it is useless to give particular directions.

However, if a vessel is bound into North Cove she keeps close to the sands on the port hand until up with Spar-buoy Number 1, when a sharp turn is made and the vessel heads for the Light-house. Anchor in three and a half fathoms of water abreast the slough. The spar-buoy should be passed within twenty-five yards, as the channel at that part is very narrow. Strict attention must be paid to the currents. They are treacherous in all the channels, run with great force, and render it impracticable to run a compass course.

Directions can not be given for vessels bound to Oysterville or Bay Centre. For this bay *a pilot should always be employed*, unless the master is well acquainted with the channels and currents.

All the indications in regard to the coast current in this vicinity are that an eddy or littoral drift follows closely the shore towards the north. It is asserted by the settlers here that boats, canoes, etc., which have broken adrift and gone out of the bay, have in every instance been found on the beach north of the entrance, and generally between it and Gray's Harbor. The wreck of the *General Warren* must have passed this entrance in its drift from the Columbia River to Gray's Harbor.

Buoys.—There are the following buoys in the approaches and entrance to Shoalwater Bay:

The Outside Bar Buoy.—This is a *first-class nun-buoy, painted with black and white perpendicular stripes.* It is placed in eight fathoms of water outside the bar, and may be passed on either hand.

The Bar Buoy.—This is a *second-class can buoy, painted with black and white perpendicular stripes.* It is placed in eighteen feet of water near the bar, and may be passed on either hand close to.

The South end of Shoalwater Spit.—This is a *second-class nun-buoy, painted black and numbered* 1. It is placed in thirty feet of water, inside the bar, on the east side of the spit, which is making to the eastward, and is passed on the port hand with a berth of fifty yards.

The North end of Sand Island.—This is a *second class nun buoy, painted red and numbered* 4. It is placed in twenty-six feet of water near the northern extremity of the shoal which lies in the entrance where Sand Island formerly existed. This shoal is reported to be making out to the westward. The course from the last buoy to this was north-northeast, and the distance three and a quarter miles, in 1886; sailing vessels should not run from buoy to buoy, but rather keep well to windward of this latter buoy, giving it a wide berth on the starboard hand.

Northeast end of Sand Island.—This is a *second-class nun-buoy, painted red and numbered* 6. It is placed in fifteen feet of water, over hard sandy bottom on the northeastern extremity of what was formerly Sand Island but is now a dangerous shoal upon which the sea breaks with great heavy weather, and treacherous currents are setting back and forth with great velocity. Steamers vessels should not approach this buoy nearer than two hundred yards.

Jenny Ford Spit.—This is a *third-class nun-buoy painted black and numbered* 3. It is placed in twenty-two feet of water on the north side of the channel almost opposite the last buoy (No. 6). It marks the junction of the Whil-a-pah channel and the channel leading to Light-house Cove.

Vessels entering the bay and bound for Light-house Cove, when up with this buoy should leave it on the starboard side and keep close to the sands on the port side, steering a course east by west one quarter west (N. by W. ¼ W.) until up with a *black spar-buoy*, which should be left just on the port hand, and the course changed sharply for the Light house. Anchor when up with or up to the Life saving station, in three and a half fathoms of water. The anchorage is very narrow, and is only available for small vessels. The cove is perfectly protected from the sea; bottom is soft mud.

Vessels bound for the Whil-a-pah River pass between the red buoy No. 6 and the buoy marking Jenny Ford Spit in a northeast direction and will pass in succession three buoys and beacons. The buoy-list must be consulted for the positions with reference to the channel, descriptions of these aids to navigation.

Vessels bound up the South Bay, to Oysterville or Nemur Rivers, when past red buoy No. 6, steer for the center of Long Island and pass within one hundred yards of the east side of Long Island, just off Leadbetter Point; thence close along the sands on the starboard hand until a black and red horizontal striped buoy is made ahead. This marks the dividing point of the channels. Vessels bound for the Nemur Rivers leave this buoy on the starboard hand; vessels bound for Oysterville or up the main channel will leave this buoy on the port hand, and pass in succession six buoys, for descriptions and positions of which with reference to the channel the buoy-list must be consulted.

Tides at Shoalwater Bay.—To find the time and height of every tide throughout the year, use the Tide tables for the Pacific Coast published annually in advance by the U. S. Coast and Geodetic Survey. Take therefrom the time and height of the required tide at Astoria. Then for Oysterville, subtract eight minutes for the time of high water and add six-tenths of a foot to the height; for the time of low water subtract twelve minutes, and for the height subtract two-tenths of a foot.

This will give the tides for Oysterville in Pacific standard (120th meridian) time. If however, the Oysterville local times of high and low water are wanted, subtract twenty four and twenty-eight minutes, respectively, from the tabular times at Astoria.

Shoalwater Bay was discovered but not entered by Meares on July 5, 1788, in the night when he was on a cruise to the southward in search of the Rio de San Roque of Heceta. He named it Shoalwater Bay. Heavy southeast weather prevented his entering it, but from the mast-head he was able to see somewhat the extent of the bay stretching to the northward and eastward.

Vancouver retained the name of the Cape, and on his chart has a rough indication of the line of breakers in front of the whole bay.

De Mofras calls it the B^e^ de Malabrigo on his chart, but he has no bay laid down.

Two officers of the United States Exploring Expedition passed through it on their way from Gray's Harbor to Baker's Bay, but do not describe it.

Tebenkoff calls it Shoalwater Bay, but his delineation on the chart is very curiously erroneous.

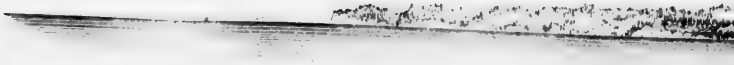
From Cape Shoalwater to Point Hanson, the south point of the entrance to Gray's Harbor, the distance is twelve miles, and the nearly straight beach runs northwest by north one-quarter west (NW. by N. ¼ N.). The hard ocean beach affords an excellent road that can be traveled by wagons at half-tide. The slightly elevated sandy bank back from the beach is about two hundreds yards wide; it has a slight rise towards the beach, and falls towards the forest. The inner edge is covered with coarse grass, and varies from a mere strip to two hundred yards in width. Back of this grassy strip and parallel with the shore is a cranberry meadow four miles in length, and in some places a mile in breadth. These cranberry marshes are divided and cut up by low, narrow ridges of pine; these ridges are of sand, evidently thrown up by the ocean long ago. The

Land beyond Point Grenville.

Gray's Harbor approach

Gray's Harbor approaches.

Point



Willoughby Rock, 123 feet.

Cape Elizabeth.

Quéniult River.

Gray's Harbor approaches.

Saddle Hill, N. ¼ E., 12 miles.

Olympic Range.

Point Brown.

Point Hanson, SE. by E., 11 miles.

Quéniult River.

Arch Rock, 82 feet.

99 feet.

Point Grenville, North, 8½ miles.

Land beyond Point Grenville. Olympic Range.

Willoughb

Cape Shoalwater Light-house,
SE. by E. ¼ E., 8¼ miles.

The Highland NE. from Cape Disappointment.

Chehalis River Valley.

Outer buoy, 2 miles.

Point Hanson (the wooded extremity), ENE., 7 miles.

Gray's Harbor.

Saw-mill at Laidlaw, South Bay.

Three views from position 7 miles WSW. from Point Hanson.

Point Brown, The Lone Tree, NNE., 5 miles.

Gray's Harbor.

Ned's Rocks (reddish-yellow).

marshes are covered with clumps of bushes and one to six feet of water. They are drained by two small rivulets running northward and forcing their way through the sand to the ocean. Land otters and beavers have their resorts around the meadows and small streams.

Six miles northward of Cape Shoalwater the grassy sand levels come immediately to the beach, and the line of trees is only two hundred to four hundred yards from the shore. At nine miles the sands again begin and broaden so that the trees do not reach within one mile of the extreme point. Behind this low coast-line the land is moderately low and densely wooded for ten or twelve miles to the east before the first higher hills are reached.

In January, 1885, the line of *equal magnetic variation* of twenty-two degrees east crossed the coast-line in the latitude of 46° 48′, nearly half-way between Shoalwater Bay and Gray's Harbor.

GRAY'S HARBOR.

This is the second large bay on the coast between Cape Disappointment and Cape Flattery. It opens through the long line of low country which extends for sixty miles between Cape Disappointment and Point Grenville. Unlike Shoalwater Bay, it receives quite a large river whose main and most eastern branch comes from the westernmost flank of the Cascade Range, while another branch heads near Olympia at the head of Puget Sound. Several smaller branches stretch in behind Shoalwater Bay and reach within twelve miles of the Columbia River.

As the bay is approached from seaward there is no high land that can be readily picked out as a landfall. The coast to the north and south is low, although covered with trees; and the high land lies well to the eastward of the bay. Saddle Hill is the only mark of reference near the bay.

Saddle Hill lies at the head of the northern part of the bay, and two miles in from the coast-line. It is seven and a half miles north by west half west (N. by W. ½ W.) from Point Brown. It is formed by two slightly rounding summits marked by straggling clumps of large trees, and when viewed from off the bar it shows only the western summit with a clump of trees on the northwest side. It does not show very much over the Point Brown Peninsula line of forest trees, and is below the distant line of the Olympus Mountains. It is probably about four hundred feet high, and would be inconspicuous but for the generally low and level character of all the country about Gray's Harbor.

This is not the Saddle Hill of Meares. He saw a prominent hill of that character when he was in the vicinity of Destruction Island, although he erroneously places it in latitude 46° 30′.

When a vessel is off the bar the "Black Hills" near Olympia show over the depression marking the Chehalis Valley; and the snow-clad summit of Mount Rainier, if the weather is clear, is then seen just on the south limit of the Black Hills and over the wooded low hills around the bay. The mountain is fourteen thousand four hundred and forty-four feet in elevation and lies ninety-seven miles north seventy degrees east (N. 70° E.) from Point Brown. If there were no intervening mountains Rainier would be visible at one hundred and thirty-eight miles on the horizon. The first notice we have of this mountain being seen from Shoalwater entrance is from the U. S. Coast Survey brig *Fauntleroy* when she lay off the bar in 1860. An examination of Vancouver's narative shows that he saw it when off this part of the Coast on his first return south.

In clear weather the Olympus Mountains, about sixty miles distant, are seen in the direction of and over Saddle Hill when a vessel is outside the Outer Bar Buoy.

Point Hanson.—The entrance to the bay is formed by Point Hanson on the south, and Point Brown on the north. Between the points the breadth of the water-way is one and two-thirds miles, but the channel does not occupy one-half of this width. Point Hanson is low and sandy, and is destitute of trees for about two miles south of the entrance. It is the northern termination of the peninsula which is four and a half miles long, with an average breadth of a little more than one mile. Although much shorter than the peninsula of Shoalwater Bay, its ending towards the entrance of the bay is very much like that of Leadbetter Point. The ocean shore of the point is comparatively regular, but the bay shore is irregular and marked by long, low, sandy arms stretching to the eastward. The sand is drifted in ridges and irregular dunes by every strong wind. In 1841 the interior of the point was marshy. Where the trees begin they are scattered and irregular, and there are large areas of burnt forest where the trunks of the trees show bare. When the wooded extremity of the point bears northeast a black object shows a little to the left of the trees. This is a house on the long narrow sand spit dragged in from Point Hanson. At the northernmost point of the forest and overlooking the marsh there is a small rise in the sand

dunes which the United States Exploring Expedition designated "De Haven's Knoll," and it is here that the Coast Survey had the secondary astronomical station in 1862.

The geographical position of this astronomical station on Point Hanson is:

Latitude	46° 56′ 42″.2 north.
Longitude	124° 06′ 42″.3 west.
Or, in time	8h 16m 26s.8.

On the 1st of January, 1885, the magnetic variation was 22° 04′ east, and the annual increase about one minute.

Point Brown.—This is the north point of the entrance to Gray's Harbor. It is a low sandy beach with a moderately regular sea front, but broken by long sand arms on the bay side. In the survey of 1852 it was cut through by the sea, and the extreme point was then formed by Eld Island; but this break has been closed and the point now occupies the old position of the southern part of Eld Island. In 1841 Eld Island was a sandy island of dunes, with grass covering the level parts.

The present formation of Point Brown is very similar to that of Point Hanson and to the points at Shoalwater Bay entrance. From the seaward beach to the bay beach the width of the point with its arms, and the width of the peninsula for its length of six and a half miles, averages one mile. The general direction of the peninsula is northwest by north from Point Brown. The bay shore is covered with fir and the outer shore is the beginning of the sandy waste stretching hence to the Copalis River. Between the forest and this waste there is a large pond or lagoon, and outside of that the sand is covered with coarse beach-grass and stunted lupin bushes, formerly cut up by the tracks of bears, cougars, wolves, elk, etc. The direction of the outer line of the forest, the pond, and the lines of sand dunes indicate clearly the prevailing wind to be from the west-northwest. When the point is seen from the southwestward, at seven or eight miles distance, it shows as a low, sandy point projected upon the distant low, wooded country in the northeast part of the bay. A short distance to the northward the darker line of fir trees on the point shows quite plainly against the distant woods on the farther side of the bay. A single, dark tree stands out from the southern extremity of the forest line on the point. Under the dark tree line are seen the sand dunes stretching far to the northward.

The southern part of Point Brown bears north twenty seven degrees west (N. 27° W.), distant thirty-seven and a half miles from the North Head of Cape Disappointment.

It is understood that a Light-house is to be built near the southern extremity of the trees on Point Brown.

Points Brown and Hanson are both broad and rounding, but the general direction of the former from Point Hanson, at the narrowest part of the entrance, is north thirty-five degrees west (N. 35° W.), and the distance a little over one and a half miles. The bearing and distance between the wooded extremities of the two points are northwest half north (NW. ½ N.) three and a half miles. When a vessel is off the entrance, and about two miles outside the Outer Buoy, the sandy extremities of these points show only as faint lines. When the wooded part of Point Hanson bears east-northeast (E. NE.), distant seven miles, the low valley of the Chehalis River is seen a little to the northward, over the sandy part of the point. The trees on Point Hanson are somewhat scattered a short distance to the right, and through quite a break in the trees still farther to the right is seen the smoke and steam from the saw-mill of the town of Laidlaw in the South Bay. Far to the south and to the north the line of the coast is quite low. Point Brown is well made out by the dark trees over the white sand dunes, and with the lone fir tree standing out from the rest. Between the Chehalis valley and Point Brown is seen the bright cliff of Brackenridge Bluff, which is eighty feet high, and Ned's Rocks which lie close off the eastern end of the bluff. Far to the northward of Point Brown, over the trees of the peninsula, rises Saddle Hill, and in that direction on clear days is seen the Olympus range of mountains rising above all the intervening low country.

Description of the Bay.—Inside the entrance Gray's Harbor expands in the form of an irregular triangle, with the apex at the mouth of the Chehalis River, thirteen and a half miles northeast by east from the entrance, and the base, towards the coast, thirteen miles long northwest and southeast. Inside of the southern peninsula terminating in Point Hanson the bay stretches irregularly to the southeast, forming *the South Bay;* the head of this part of the bay is six miles from Point Hanson at the mouth of Elk River,* which is a short stream. There is a narrow entrance

* The Sopun Inlet of the U. S. Exploring Expedition, 1841.

carrying about nine feet of water through the mud-flats of South Bay for three and a half miles.

Inside of the northern peninsula terminating in Point Brown is *the North Bay*, which has a breadth of five miles east and west. Into it empty several small streams, and a moderately large river called the Humptolups. The North Bay is mostly occupied by mud-flats, through which run three or four channels carrying eight to twelve feet as far as abreast of Ned's Rocks. The mud-flats are so extensive, and the mud so soft in many places, that it is impossible to reach the shore except at high tides.

Six miles inside the entrance the bay contracts to three and a half miles in width between Stearns Bluff on the south side and Brackenridge Bluff on the north side; thence eastward to the mouth of the Chehalis River the contraction is gradual.

By measurement we find that more than nine-tenths of Gray's Harbor is bare at low water, and there are no islands in the broad part of the bay. Inside of the entrance the area of the surface of the water bounded by the flats bare at low tide is only four and a half square miles. This will give a fair idea of the extent of the harbor as such. The greatest depth in this area is eighty feet, but that is in the main channel way. Through the flats lying between this available space and the Chehalis River run two channels to the east-northeast. The northern channel commences at a point two miles east by north from Point Brown with five and six fathoms of water and runs midway through the bay between Stearns Bluff and Brackenridge Bluff, when it gradually trends northeastward to the northern shore; but the depth is decreased by it dividing into two channels, one stretching to the east under the southern shore; both these subdivisions again join at the mouth of the river. The southern channel starts from the same position as the northern, but runs nearly direct for the north side of Stearns Bluff and follows close under the southern shore and finally runs into the south branch of the northern channel. This southern channel is narrow, badly developed at the mouth, and carries less than ten feet of water to the mouth of the river.

The shores of the bay are heavily forested, the lands are low, and the banks are marshy in many places. A few notable bluffs rise but a few feet above the waters of the bay. Inside the entrance the first noticeable point is *Stearns Bluff** on the south side of the bay. It lies six miles north sixty degrees east (N. 60° E.) from Point Hanson; it is a slightly projecting bluff covered with trees. It is the western termination of Boileau Hill,* which lies two or three miles to the eastward. To the east and to the west the shore is low but wooded. The south channel runs close under the bluff.

Brackenridge Bluff is the shore on the north side of the bay, three and a half miles north thirty degrees west (N. 30° W.) from Stearns Bluff. The southern point of the bluff lies six and a half miles north forty one degrees east (N. 41° E.) from Point Brown; but it stretches two miles farther to the east-northeast, and one mile farther to the west where it is broken, bright, and visible from outside the bar. The height of two distinct parts of the bluff, two-thirds of a mile apart, is eighty feet. After stretching to the east-northeast for two miles the bluff leaves the immediate shore line and continues inside the bordering low lands for two miles farther to the Hoquiamts River at two miles from its mouth. There is no high country behind it. There is no channel near this north shore; nothing but broad mud flats.

Point New.—This is a low, marshy point covered with forest and forming the western extremity of the line of the Brackenridge Bluff. It lies five and three-quarters miles north thirty-two degrees east (N. 32° E.) from Point Brown. It is marked by *Ned's Rocks*,* which are three very small islets, about fifty feet high, with reddish sides, lying close under the point. They are not visible from outside the bar, but the bright cliffs of Brackenridge Bluff are visible and are generally called Ned's Rocks. There is the head of a small channel reaching to the west side of these rocks.

There are several rivers emptying into Gray's Harbor. In the North Bay, between Point New and Point Brown, there enter three small streams of moderate size. One mile north of Point New is the mouth of the *Typso Creek*, which is not five miles long. The channel leading past Ned's Rocks comes from the mouth of this stream.

Two and a half miles north-northwest from Point New is the mouth of a smaller stream called the Chinois Creek, from which leads a very small channel through the mud flats.

The principal stream in the North Bay is the *Humptólups River*,† which enters at three and a

* So named by the U. S. Exploring Expedition in 1841.

† The Koom-toh'-lapsh of the Chehalis Indians.

quarter miles northwest one-quarter west from Point New. This stream is about twenty miles long and heads in the southern part of the great mountain area of Olympus. Its general direction is south. There is a channel from it through the mud flats. Two other very small creeks enter the North Bay.

Under the north shore of Gray's Harbor, six miles eastward of Point New, is the entrance of the *Hoquiamts*, whose headwaters are very near those of the Humptolups, under the flanking hills of the Olympus Mountains.

The Chehalis River.—This is the principal river entering Gray's Harbor. It is a large stream one hundred and thirty miles in length, draining a very large area of country to the eastward as far as the flanking hills of the Cascade range. One large branch, Elk Creek, turns back to the westward towards the small streams running into Shoalwater Bay. The Black River branch reaches towards Puget Sound. The Satsop heads towards the great bend of Hood's Canal, another branch from the north opens into the Chehalis abreast Montesano; and Wishkahl River* from the north enters about three quarters of a mile inside the mouth of the Chehalis.

The Chehalis itself is navigated to Montesano, twenty-five miles from the entrance to the bay, at the head of tide water, but it can be made navigable much higher. In 1884 a depth of only six feet could be carried to the mouth of the river. The river drains a comparatively low-lying country, heavily forested with spruce, fir, and cedar, but dotted by many small prairies and rich bottom lands. Claqnato, Sharon, Elma, New Montesano, and Cosmopolis are the principal towns on the river.

The immense forests have led to the establishment of several large saw-mills on the bay and rivers, and the agricultural and dairy advantages have favored the new towns. The old town of Montesano is on the left bank of the river, opposite the mouth of the Wynooche, where a saw mill was built in 1873 or 1874. The present population is about one hundred and fifty. Behind the town there is a line of higher ground, and the bluffs reach the bank of the river. The high land behind these appears to be about the position of the "Boston Hills" of the United States Exploring Expedition, 1841. The new town of Montesano is on the right bank of the river, about one mile above the old town. It is not on the immediate bank, which is low, swampy, and sometimes overflowed, but on the higher land one thousand yards back, and an elevated trestle road leads from the town to river, where steamers from Astoria, drawing nine to ten feet of water, land at the wharf at the end of the road. There is no obstruction to navigation except some broken snags. The place contains some fine buildings and has a population of about five hundred.

Cosmopolis is on the south bank of the river, three miles inside the mouth and fifteen miles from the entrance to the bay. It has about thirty buildings, among which is a fine hotel, and a population of about two hundred.

At the junction of the Wishkahl River is the town of Aberdeen, thirteen and a half miles from the entrance, with three saw-mills, a fish cannery, etc., and a population of about three hundred. The Wishkahl is reported navigable for small steam-boats for fifteen to twenty miles.

At the mouth of the Hoquiamts River is the town of Hoquiam on the right bank of the river and eleven miles from the entrance to the bay; it has a population of two hundred and fifty, and the Simpson saw-mill is located here. In 1868 a freshet tide rose ten feet above the highest tidal marks up to that time in this vicinity.

There is a saw-mill at the town of Laidlaw in South Bay, four miles from the entrance, and when a vessel is off the bar the smoke and steam of the mill are distinctly visible near the south part of the scattered trees on the south peninsula. At the mouth of the John's River, which empties into the bay about one mile south of Stearns Bluff Point, there is the town of Markham. Bay City is a small place on the east side of South Bay, lying nearly east of Point Hanson.

The "City of Gray's Harbor" is located on the north shore of the bay about one and a quarter miles east of Brackenridge Bluff.

A new town-site has been cleared of timber, and a great wharf is being built directly southeast for more than one mile from the shore over the broad flats to deep water at the main channel. The city is to be the center of an extensive lumber traffic, and the Tacoma, Olympia, and Chehalis Valley Railroad is to follow the right bank of the Chehalis for about seventy miles to the town of Centralia (a few miles south of Olympia), and there connect with the Northern Pacific to Tacoma.

*Hoish-kahl of the Chehalis Indians.

The Chehalis River is partly in the United States collection district of Oregon, and partly in that of Puget Sound. Astoria, Oregon, and Port Townsend, Wash., are the ports of entry. A coasting steamer plies regularly from Portland and Astoria to Montesano.

HYDROGRAPHY OF THE APPROACHES TO GRAY'S HARBOR AND AIDS TO NAVIGATION.

The three-fathom line outside the entrance to the bay is a little more than three miles outside the general trend of the ocean shore south and north, and forms a horseshoe curve of heavy breakers around the entrance. The ten-fathom curve is about two thirds of a mile outside the three-fathom curve, and the bottom is fine gray and black sand.

Tebenkoff has a sounding of forty-two fathoms at seventeen miles west of Point Hanson, and sixteen fathoms at ten miles southwest two-thirds west (SW. $\frac{2}{3}$ W.) from the same point. In 1854 we found forty-five fathoms over muddy bottom sixteen miles broad off the harbor, and Vancouver has the same depth just outside of our position.

The littoral current off the entrance to Gray's Harbor is to the northward parallel with the shore. In 1860, when the Surveying Brig *Fauntleroy* was a mile outside the bar, the current was moving to the northward about one and a half miles per hour, and when anchored on the bar the ebb-current from the bay struck this littoral current and the whole body of water set to the northward at a rate of two and a quarter miles per hour. This experience agreed with previous reports and has been confirmed by subsequent observations. (See note under Copalis River of the current carrying part of the wreck of the *General Warren* to the north.) Vancouver found a current in this vicinity running to the northward; Tebenkoff has the same indicated on his chart.

In 1885 there was a depth of twelve feet of water on the bar which was three and one-half miles south-southwest (SSW.) from Point Brown, and three miles west-southwest (WSW.) from the main beach at Point Hanson, the extreme point of which bore northeast by east (NE. by E.). In July, 1887, there was a depth of eighteen feet of water on the bar almost exactly where the bar was in 1885.

In June, 1887, the depth of water on the bar had increased to eighteen feet very nearly where the channel had been from 1883. As the buoys are subject to change of position to mark changes of the channel and bar, *strangers should not attempt to cross the bar* and *enter without a pilot.*

There is an automatic whistling buoy outside the bar; an *inner bar buoy*, first-class nun, painted with black and white perpendicular stripes; channel buoys on both sides, when necessary, second-class can-buoys; and inside channel buoys, third-class nun-buoys.

WHISTLING BUOY.

A *second-class automatic whistling buoy*, painted *red* and marked GRAY'S HARBOR in white letters, has been placed in the approaches to this bay. It lies in twelve fathoms of water over sandy bottom, one mile outside the bar at the entrance. The buoy is sounded by the action of the water and gives twenty or thirty blasts each minute.

The following approximate bearings and distances to noticeable objects locate its present position:

	Miles.
Solitary spruce tree on Point Brown (North Point), NE. by N. $\frac{1}{4}$ N.	$5\frac{7}{16}$

This tree is one mile inside the outer beach of the Point.

House on Point Hanson (sometimes Point Chehalis), NE. by E. $\frac{1}{4}$ E.	$5\frac{7}{16}$

This house is one and three-eighths miles inside the outer or ocean beach.

North limit of forest on Point Hanson, NE. by E. $\frac{1}{4}$ E.	$5\frac{1}{8}$
Inner Bar buoy, NE. by E. $\frac{1}{4}$ E.	$2\frac{1}{8}$
Cape Shoalwater Light-house, SE. $\frac{1}{4}$ E.	13

This buoy was put in position July, 1888, and takes the place of the Outer bar buoy.

The Inner Bar Buoy.—This is a *first class nun buoy, painted with black and white perpendicular stripes*, and placed just inside the bar (1887). It was placed in twenty-eight feet of water and lay one and one-third miles northeast three-fourths north (NE. $\frac{3}{4}$ N.) from the outside bar buoy. It is passed close on either hand.

The North Breakers Buoy is a *first-class nun-buoy, painted black, numbered* 1; it is placed inside the bar on the north side of the channel close under the North breakers. In 1885 it was lying in thirty-four feet of water, over a hard, sandy bottom one and one-half miles northeast by

north (NE. by N.) from the Inner bar buoy. It is passed on the port hand. This buoy is about a mile and one third outside the entrance between the two points of the channel, which is here only three-eighths of a mile wide between the three fathom curves, and was close under the Spit Point.

The Channel Buoy.—This is a second-class nun-buoy, painted black and numbered 3. It is placed in the channel in fifty feet of water, over a bottom of fine gravel and shells. This buoy was at miles west one-half south (W. ½ S.) from the house on the eastern part of Point Hanson eighths of a mile from the nearest beach on that bearing.

There are strong current or tide rips under the north side of the channel just inside the entrance.

The Whitcomb Flats Buoy.—This is a *third class nun buoy, painted red and numbered* 4. It is placed inside the entrance, in thirteen feet of water, over gray sand on the northwest limit of the first flats inside which are bare at low water; and it marks the southeastern side of the approach to the main channel hence to Hoquiam, Aberdeen, and the mouth of the Chehalis River. In 1887, it was located one and five-eighths miles inside the entrance, and from it the Solitary of Point Brown bore north sixty-four degrees west (N. 64° W.), distant two and one miles, and the House on Point Hanson south three quarters east (S. ¾ E.), distant one quarter miles.

In July, 1887, a *first-class can-buoy numbered* 1 had drifted northwestward to the outer edge of the breakers just to the northwestward of the bar. It was in four fathoms of water. It does not belong to the system of buoys.

The breadth of the three fathom channel at Whitcomb Flats buoy in 1883 was about two eighths of a mile with a depth of fifty-five feet in mid channel west of the bay, and the sides of the flats are steep to and bare at low water. Inside of the Whitcomb Flats Buoy there is a series of five Beacons painted black or red to mark the channel for the next twelve miles to Hoquiam and Aberdeen.

The Buoy list, published in October of every year, gives the location of the buoys in the approaches to the bay and in the channels.

In a former edition we have given the details of the changes of the bar from known surveys, but it is not considered essential to again refer to them.

Tides.—The Corrected Establishment, or mean interval between the time of the Moon's meridian transit and the time of high water, is XII^h 33^m, and the mean difference between the a. m. and p. m. tides of the same day is 1^h 07^m for high water and 0^h 55^m for low water. When the Moon's declination is greatest these differences are 1^h 52^m for high water and 1^h 29^m for low water. The mean rise and fall of the tides is seven and one-tenth feet. The mean difference in height of the a. m. and p. m. tides of the same day is one and one half feet for high water and two and seven tenths feet for low water; when the Moon's declination is greatest these differences are two and two-tenths feet for high water and four and one-tenth feet for low water. The average difference in height between the higher high and the lower low waters of the same day is eight feet, and when the Moon's declination is greatest, nine feet.

The highest high tide in the twenty four hours occurs 11^h 39^m after the Moon's upper transit (southing) when the Moon's declination is north; and about 47^m before that transit when the declination is south. The lowest low water occurs about seven hours after the highest high water.

In 1884 the hydrographic examination reports the winter tides at Point Hanson rose 12 feet feet above the plane of reference of the Coast Survey. This must evidently be under circumstances of heavy southerly weather and freshets in the rivers.

Gray's Harbor was discovered by Capt. Robert Gray, of the American ship *Columbia*, in May, 1792, and was named by him Bullfinch Harbor, after one of the owners of his vessel. In October of the same year it was surveyed, under the direction of Vancouver, by Lieutenant Whidbey, in the store-ship *Dædalus*. He first sent in his boats and then crossed the bar in three fathoms, with the ebb current running so strong that little progress was made although the ship was going nearly five knots through the water. He applied the present name, Gray's Harbor, in compliment to the discoverer. On some old English charts (Arrowsmith, 1798) it is called Whidbey's Harbor. Whidbey named the southern point Point Hanson, after the commander of the *Dædalus*, and the north point he called Point Brown, placing it in latitude 46° 59½′.

The southern point was called **Point Chickeeles** by the United States Exploring Expedition in 1841, and placed in latitude 46° 55′ 30″; and the same name was applied to the river which

was examined at that time to as far as the Sachap River (present Satsop). This river was placed twenty-nine miles from the mouth of the Chehalis, and three feet of water could be carried to it. At seventeen miles from the mouth of the Chehalis was placed the high land extending on the left bank of the river for over a mile, and named the "Boston Hills;" but there are no hills that come so sharply on the river as that chart shows. The North Bay was called Useless Bay.

The Indian name of the south point of the bay is Chehalis. They pronounce it Tehé-he-lis or Tsi he-lis, the word signifying sand. This name was applied to the point for some time when the camp of a company of United States soldiers was located here in 1860 and remained fifteen months. Locally the inner side of the point is known as Peterson's. In the first charts of the Coast Survey the southern point is termed Point Harrison (a clerical error). Among the earliest settlers (1852) in this region it was called Point Armstrong. The Indian name of the River is Nesalups. There were formerly nearly a dozen villages around the shores of the Bay.

NORTH OF GRAY'S HARBOR.

From Point Brown the shore trends north thirty-six degrees west (N. 36° W.) for twenty-six and a quarter miles to Point Grenville. There is a slight recession of one and one third miles to the eastward from the Copalis River to the Cape, and the three-fathom line is fully a mile and a half off the low beach. The peninsula of Point Brown is about one mile wide and six miles long. The bay shore is low, margined by trees and stretches of marsh. This narrow fringe of trees begins about one mile from the point and is there quite narrow. On its western side is a long, narrow lagoon, lying nearly northwest by west, with parallel lines of sand dunes on the outside and towards the ocean beach. This dreary waste of sand dunes, partly covered with beach grass and stunted lupin bushes, continues between the beach and the forest thence to the Copalis River. From this point there is a low bluff behind the beach for two miles to Copalis Head where the cliffs come directly upon the ocean. The low-water beach is quite broad along this whole stretch of coast.

After that there are only two small pieces of low bluffs to Point Grenville Cove. The first small stream breaking through the beach is Connor Creek, seven miles northwestward from Point Brown. There are Indian houses at the mouth of the stream and for some distance southward. The marsh inside the sand dunes reaches to within one mile of this creek.

Connor Creek is choked with drift-wood as soon as the forest is reached. It can be forded at its mouth at low water in any kind of weather except during freshets.

The shore between the entrance to Gray's Harbor and Point Grenville is the home of the Sea Otter, so valuable for its fur. The hunters build scaffolds (locally known as "derricks") about thirty feet high in favorable places overlooking the beach. The Sea Otter never comes nearer the shore than the outer line of breakers, and he is necessarily shot within three or four hundred yards of the beach with very heavy target-rifles. There are seldom more than six or eight of these hermit hunters on the beach at one time, and they are fortunate to secure five or eight skins in the season. The skins are worth $75 to $100 each.

The beach is hard, clean sand, and inside of it there is a continuous line of heavy drift trees and logs thrown just above ordinary high water. Among this drift are found the redwood logs, etc., from the California coast.

Copalis River.—Eleven miles from Point Brown is the mouth of the Copalis River, and just north of it the country rises to one hundred feet near the shore. The stream has a long, low sand spit on the south side, and opens to the northward, while the channel runs out nearly straight west-southwest through a very broad, low-water beach. In 1887 it was seventy yards wide through these sands. Inside the forest line it is two hundred and fifty yards wide for a short distance, and then narrows to sixty yards. There are three or four settlers' houses on the river. The entrance is obstructed by a bar with only two to four feet of water upon it, and it is therefore impassable for any vessels.

It is navigable for small boats and canoes about one mile above its mouth. It is fordable near the mouth, in smooth weather, at extreme low tides except a freshet be running. It is said that within a reasonable period the river ran a mile and a half farther northward and emptied under the south side of Copalis Head, but there are now no signs of such a course. The river is not more than ten miles long, and comes from the northward and nearly parallel with the Humptolups River. The country is low-lying, especially near the sea, and although densely forested, there are said to be prairies along the course of the stream. Like all the streams on this Coast, the

Copalis abounds in Salmon, which are reported to be of very superior quality, although they are much smaller than the Columbia River salmon. There are two houses at the mouth of the Copalis.

The geographical position of the north side of the entrance at the forest line is:

Latitude	47°	07′	07″ north
Longitude	124	11′	12″ west.

Upon the north or right bank of the stream, near the mouth, formerly resided the Copalis tribe of Indians, from whom the river is named. It has been erroneously called the Chipalis on recent map, and the Chepalis on the reconnaissance of 1887. For two miles north of the Copalis the sandy shore-line continues, but the land immediately behind it rises to one hundred feet, is covered with wood.

Copalis Head is south forty-three degrees east (S. 43° E.) eleven and one-quarter miles from Point Grenville and one and three-quarter miles northwest by north from the Copalis River. It is the only rocky point hence to Point Grenville. It is a bright bluff rising about two hundred feet above the sea, and continues two miles about one hundred and forty feet high and over, bearing as the beach from the south.

The bluff is composed of dark clay. It can not be passed by teams at extreme high water. In rough weather it should be ventured only at low water.

Along the beach in the vicinity of the head there are deposits of magnetic oxide of iron (black sand), carrying fine particles of gold, but several mining parties have failed to make it pay.

The beach is broad and rocky, and off this lie two small rocks five hundred and fifty yards from the shore; the highest rock* is thirty-five feet above the water. Nearly one-half mile off the head is a rock awash at low water.

The geographical position, as determined by the U. S. Coast and Geodetic Survey, is

Latitude	47°	08′	50″ north
Longitude	124	12′	03″ west.

There is one house just north of Copalis Head.

From seaward these rocks are seen projected against this short line of bluff. They were mentioned by Heceta in 1775, and by Vancouver who anchored directly abreast of them in 1792. It is off this point that the depth of water increases quite suddenly.

> And this is the only place where the Indians can land through the surf, for here the sea breaks directly on the beach in one large breaker; farther to the north and to the south, where the water is shoal, the breakers stretch out a great way.†

The *littoral current* along this shore is to the northward, and all drift material from Shoalwater Bay and Gray's Harbor moves to the northward against the summer winds. We have elsewhere mentioned the drifting of the wreckage of the steam-ship *General Warren* from Clatsop Spit, the Columbia River, to a point one mile north of the Copalis. As a very strong proof of the existence of this littoral current to the northward the coast thence to Cape Flattery is strewn with redwood logs.

Boone Creek.—This stream emptying half a mile north of Copalis Head can be forded at ordinary half-tide, except when swollen with rains and melting snow. North of Boone Creek there is "black sand" on the beach with fine gold particles.

Jo Creek is a moderately large creek opening on the ocean three and one-half miles northward of Copalis Head. There is a small piece of bluff on south side and also on the north side.

This stream can be forded at ordinary half-tide except during freshets.

Nemotolipse River is a moderately large stream six miles northward of Copalis Head and one-quarter miles south fifty-eight degrees east (S. 58° E.) from Point Grenville. It has a bare, sand peninsula on the south side half a mile long and about fifty yards broad; on the north side of the stream there is a bright bluff reaching fifty feet high abreast the entrance. There are three houses just south of the mouth of this stream.

This stream is the southern boundary of the Quniault Indian Reservation. It can be forded near the mouth at low water; teams usually cross near the south end of the bluff and follow the right bank under the bluff to the north. The bluff is yellowish clay.

* *Copalis Rock.*—This is conical and very conspicuous. It rises to thirty-five feet above the sea, and near it bolted to its apex the small hut of a sea-otter hunter. The rock is surrounded by breakers and can be reached by a canoe in the very smoothest weather. This hunter often remains at his station for long periods cut off from communication with the shore except by signs.

† The Northwest Coast; or, Three Years' Residence in Washington Territory, 1857.

Conical Rock. Sonora Reef. 92 feet. Arc
Cape Elizabeth, E. ¼ S., 3 miles. Point Grenville, E. by S. ½

Sea Lion Rock, NW. by N., 8 miles; 15 feet. Split Rock, 5 miles; 85 feet. 3¼ miles. 6½
Willoughby Rock, 123 feet. Arch Islan

Flat Rock. Raft River. "Two Heads."
Arch Island, E. by S. ¼ S., 4½ miles.

92 feet. Arch Rock, 82 feet.
Point Grenville, E. by S. ¾ S., 8 miles.

6¾ miles. 5 miles. Cape Elizabeth, N. by E. ½ E., 3 miles.
Arch Island, 7 miles.

Willoughby Rock, 123 feet. Cape Elizabeth, SE. ¼ E., 10 miles. Split Rock, 85 feet. Sea Lion Rock, 81 [illegible] miles.

Cape El

Sea Lion Rock, NW. by N., 8 miles; 15 feet.

Split Rock, 5

85 feet.

e Elizabeth, N. by E. ½ E., 3 miles.

Flat Rock. Raft River.

Rock, 85 feet.

SE.

Sea Lion

SE., 5

Arch Island, E. by S. ½ S., 4½ mls.

Point Grenville, NNE., 5 miles. Arch Rock, 82 feet. 92 feet. 94 feet. 99 feet, under Eastern shore. Anchorage.

Split Rock, 85 feet, NNW., 9½ miles. Willoughby Rock, 123 feet. Arch Island. Cape Elizabeth, N. ¾ W., 6½ miles. Quéniult Village.

Point Grenville, E. ¼ S., 5 miles. 92 feet. Arch Rock, 82 feet.

The beach is bold, and in moderate weather the breakers are quite heavy at the entrance to the stream.

Wreck Creek is a small stream lying two miles east by south from Point Grenville and eight and a half miles north of Copalis Head. It has low sand spits on either side, thence to the Cape the low water beach narrows, and the land rises inside without exposed cliffs.

This stream can be forded at ordinary half-tide, except during freshets.

POINT GRENVILLE.

From Copalis Head to Point Grenville the coast continues in the same general direction as from Gray's Harbor, Shoalwater Bay, and Cape Disappointment, and the characteristic features of the country are similar. From Copalis Head the distance is nine and one-third miles and the bearing north forty-three degrees west (N. 43° W.). The shore-line is nearly straight, with a hard sand beach which changes to shingle disposed in long rows parallel with the shore. These ridges of shingle dam the mouths of many small streams and form ponds abounding in trout, and formerly well stocked with beaver and otter. Inside of these ponds the land rises in cliffs covered to the edge with a dense undergrowth of fir and cedar.

As Point Grenville is approached along the shore the high land comes down much nearer to the beach and forms sandstone cliffs with rocky ledges projecting into the sea. About one and a quarter miles before reaching the point the high shore-line sweeps to the west and west-southwest for nearly a mile, and then curves about one-quarter of a mile to the south-southwest. Along the shore of the bay rocky masses extend out to the edge of low water.

Before reaching Point Grenville the beach becomes so rocky that for one mile it can not be traversed by wagons.

A road has been built over the point because there is no beach around it.

Point Grenville is a broken, rocky, sandstone promontory with nearly vertical, whitish cliffs that are more than one hundred feet high. Even inside the point the cliff is very steep, and is ascended only by a difficult trail, formerly used by the Indians. The hills rise irregularly behind the point to a few hundred feet in two or three miles; but farther inland they increase to probably eight hundred feet. All the hills are covered with fir and cedar. The point itself is marked by several large rocky masses standing out from the shore, and by many small and low rocks. The two large and prominent rocks outside the point are seen projected on each other, when approached from the south. The two rocks on the inside of the point, and on the prolongation of its ocean face, are so close together that they are frequently seen as one. The two lie three hundred yards east by south one-half south from the easternmost cliff of the point, and there is twelve feet of water just east of them. The inner and larger one is ninety-nine feet high, and the outer one ninety-four feet. The most notable of the two outer rocks is the *Arch Rock* which lies over half a mile south from the western part of the cliff, and nearly three-fifths of a mile south thirty-six degrees west (S. 36° W.) of the inner extremity of the point. It is eighty two feet in elevation, and shows a large arch through it when seen from the south-southwest. There is a depth of four fathoms of water close around it, and four fathoms half-way between it and the west point of the Cape.

This rock shows white in summer from the bird deposits which are usually washed off in winter by the rains and heavy seas. The arch lies east and west.

Four hundred yards west-northwest from the Arch Rock lies a small, low *rock awash* at high water, forming a danger in the approaches. The western rock off the western point of the Cape is about two hundred yards from the cliffs and rises to ninety-two feet above the sea. There are plenty of rocks inside of it but none outside. The depth of water close under its south side is ten feet, reaching three fathoms nearly one-third the way out to the Arch Rock.

From this western rock along the eastern point of the cliffs, there is a large number of low rocks reaching thirty-four feet high, lying two hundred and fifty yards from the south face of the cliffs, with fifteen feet of water off them. As Point Grenville is approached along the shore from the southward the high land comes down much nearer to the beach and forms sandstone cliffs with rocky ledges projecting into the sea.

When approached from seaward from the southward Point Grenville is not distinctly made out, because it is projected on the cliffs of Quiniault Point or Cape Elizabeth, three or four miles to the northwest. As seen from the west to southwest it is at the eastern limit of the bright cliffs, reaching from the latter point, and has two dark rocks projected against it. Over the

wooded coast is seen the great mass of the Olympus range, with the principal peaks bearing about north-northeast.

When seen from the south-southwest these two large dark rocks appear truncated, and show well as projected against the bright cliffs. The outer one is the Arch Rock, and the arch is seen through it at five miles distance.

When seen from the west-northwest the rocks lie clear of the point; the high rock close the outer point of the cape is only three diameters outside the cliff, and the Arch Rock well out and projected against the long, low, wooded land to the southeast. The inner rocks are not then visible.

Point Grenville Cove forms a very contracted and exposed roadstead, which should be used only as a harbor of refuge; apparently it has a rocky bottom. It can be used as an anchorage in northerly smooth weather for craft below medium size.

The extreme southerly point and the two large rocks break the force of the sea considerably.

The three-fathom line extends half a mile from the beach, and a vessel, unless of but little draught, is compelled to anchor so far out that the point, and the rocks off it, afford but little protection from the prevailing west-northwest winds of summer. It is useless during the winter months. In ordinary weather a vessel may anchor in four fathoms of water over sandy bottom, with the innermost point of Grenville bearing northwest (NW.) and the outlying Arch Rock bearing west (W.). In this position the three-fathom line lies one-third of a mile north and five-eighths of a mile eastward; but the shore to the north is nearly seven-eighths of a mile, and to the east nearly one and a quarter miles distant. There is a broad, low-water beach from the north side of the point round by the east and southeast. It is reported that a boat can land under Point Grenville, except in the very heaviest southerly gales. When a vessel is close under the point, with the inner extremity bearing very nearly north, several rocks are seen off the cliffs at Cape Elizabeth, four miles to the northwest, and one of them, close inshore, is shown on one of the old views as a small leg-of-mutton sail, but this rock does not exist.

All these rocks were formerly the resorts of sea-otters, and at present the two larger rocks have great numbers of sea-lions upon them.

The Sonora Reef.—A dangerous reef stretches out from Cape Elizabeth nearly south-southwest to within one and a half miles of Point Grenville. The southern tail of this danger is one and one-eighth miles off the cliffs, about one third of a mile in extent, and lies north sixty seven degrees west (N. 67° W.), one and a half miles from Arch Rock. (See Cape Elizabeth.)

The approximate geographical position of the Arch Rock off Point Grenville, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 17′ 39″ north
Longitude	124° 17′ 49″ west
Or, in time	8h 17m 11s.3

In January, 1885, the magnetic variation was 22° 22′ East, with a yearly increase of [illegible].

From the Arch Rock, off this point, we have the following bearings and distances to prominent objects:

Destruction Island (proposed Light-house), not intervisible	N. 43°	W.	23¾ miles
James Island, Quillihute River	N. 44½	W.	34½ miles
Carroll Islet, North of Cape Johnson	N. 45°	W.	41 miles
Gray's Harbor Outside Buoy	S. 33°	E.	23½ miles
Cape Shoalwater Light-house (not intervisible)	S. 3°	E.	36½ miles
Cape Disappointment, North Head	S. 28½	E.	61 miles
Tillamook Rock Light-house	S. 28°	E.	82½ miles
Yaquina Heads Light-house	S. 24°	E.	158 miles

In June, 1855, when we were nearly becalmed off the bright cliffs of Point Grenville to Quiniault Point, we found we were upon a bank west by north (W. by N.) sixteen miles from Point Grenville; we had soundings in fifteen fathoms of water over a very soft mud bottom; twenty-one miles, seventeen fathoms; at twenty nine miles, thirty six fathoms, and three miles south southeast from the first position we struck sixteen and a half fathoms. The character of the bottom was the same in all the soundings. We were bound for Admiralty Inlet and had no time to make an extended examination. In April, 1856, we found forty five fathoms of water in latitude 46° 54′ north, longitude 124° 33′ west, being sixteen miles broad off shore. Vancouver has fifty fathoms inside the position of our fifteen fathoms, assuming his position by dead reckoning to be correct.

Vancouver found the current here running to the northward, and Tebenkoff's chart indicates the same current.

Point Grenville was first noticed in the second expedition of Don Bruno de Heceta, in July, 1775, when the frigate *Santiago* of his command was in danger of the reef under Cape Elizabeth, and ran to the southward of the point about one mile when she anchored while the schooner was in trouble off the Quiniault River. It was under the point that the frigate, being at anchor, took possession of the country "in that road."

It was named Point Grenville by Vancouver in April, 1792, when he placed it in 47° 22′, and adds, that lying off the point are "three rocky islets, one of which, like that at Cape Lookout, is perforated;" and it is so marked on his chart. On his return from the north he anchored nearly abreast of the rocks off Copalis Head, and the coast from Grenville towards Destruction Island is fairly well represented on his chart. When south of Point Grenville Vancouver says he had sight of a remarkably high, round mountain, which rose very conspicuously above a line of low, or rather moderately elevated land, and which was covered with snow down to the intervening line of trees. By subsequent observation he established this object as Mount Rainier.

De Mofras' chart designates this point Pt. de la Bastide ou Grenville.

It was examined by the U. S. Coast Survey in the reconnaissances of 1852 and 1854. In the latter year it was placed approximately in latitude 47° 20′.

Point Grenville is within the limits of the Quiniault Reservation for the Indians.

Point Grenville to Quiniault River.—The beach between Point Grenville and the Quiniault River is formed of a very coarse, shifting sand; it is very bold and is impassable at high tide, or at half-tide in rough weather.

QUINIAULT RIVER.

The mouth of this small stream is just three miles northwest from Point Grenville, and one mile east of Quiniault Point or Cape Elizabeth. From Point Grenville the shore is very straight to the Quiniault. The first two miles are bluffs with a good low-water beach. The last three-quarters of a mile is low, ending in a sandy and gravelly point forming the south point of the entrance to the river. At certain seasons it is almost closed by the shingle and gravel thrown in by the surf. The closing of the entrance has so far dammed the river as to form a small lake, two hundred yards wide, upon the south shore of which is situated the village of Quéniult. On the western side of the lake there is a short, narrow channel to the ocean that is available as a passage for canoes at high water in calm weather.* In 1887 the entrance was about ninety yards wide at high water and about fifty yards at low water. Under the bluff on the northwest side there is a long sand beach, and the mouth of this stream must change somewhat with the seasons. This river rises in a large lake about twenty miles distant in a direct line to the east-northeast and lying in the southwest hills of the Olympus Mountains. It has the same name as the river, and is the eastern limit of the Indian Reservation. It flows through a heavily wooded country of spruce, fir, hemlock, and cedar, and can be navigated for fifteen or twenty miles. It has a strong current, and can not be forded. On the south or left hand are located the Quiniault Indian Agency and village.

The stream abounds in fine Salmon, which begin to run in January and continue until the latter part of June. The Indians catch them by means of weirs. The approaches to this stream have not been examined. Near the mouth sea-otters were very abundant, but they have been hunted almost to extermination. Sea lions are not plenty in this immediate locality.

The Sonora Reef.—It is reported that there is a nearly continuous reef from Cape Elizabeth to Point Grenville, having a crescent or semi-circular shape, convex seaward, the dangerous line showing only in a heavy swell and some parts of it baring at low water. The southern end of this reef is two and one-half miles southeast by south one-third south (SE. by S. ½ S.) from Cape Elizabeth and one and a quarter miles broad off the shore. It reaches within one and a half miles of Point Grenville; this reef lies inside the usual course of the coasting vessels and was inside the course of the surveying steamer in 1854.

In stormy weather the swell breaks with great fury upon the reef. In December, 1886, the British bark *Sir Jamsetjee Family* was wrecked on the inside of the reef. She sailed in between the reef and Point Grenville and struck on the innermost rock under Cape Elizabeth, where she

*Northwest Coast. Three years' residence in Washington Territory, 1857. Page 263.

went to pieces. Within the year 1887 a vessel got inside this reef, but sailed out by the way she came in.

In the heaviest weather a few clear passages are seen through this reef.

Outside of this reef, at an estimated distance of one mile, there is an isolated breaker which shows only in a large swell, when it heaves up occasionally for seventy five yards in length, and is very heavy. The Indian Agent at Quiniault Reservation informs us that he has seen the steam colliers, bound northward light, passing outside this breaker. (See remarks in description of Point Grenville.)

The Quiniault River opens into the deepest part of the bight behind this reef.

There is an Indian Agency near the village of the natives. These Indians and their neighbors for a long time had a very bad reputation, and were notorious for their hostility and vindictiveness to the early voyagers. Several Spanish, English, and Russian vessels were, in the early days, taken and destroyed. Lewis and Clarke say this tribe had sixty houses and numbered one thousand souls. It was in this bight that Bodega in 1775 lost seven of his crew of sixteen of the Schooner *Sonora*. When seeking for an anchorage he found himself passing over a reef and warned the frigate not to follow. The reef has been named after his vessel.

The name of the river is usually known by the old settlers as Qué-noith, but the Indians formerly pronounced it as if spelled Qué-ni-utl, accenting the first syllable strongly and the last one softly and long that many persons consider they call themselves the Quénai.* The Mukkaw call the tribe Quén-a!tl. A great variety of spelling has been given to the name. De Mofras' chart calls it the R. Kiniat. Meares doubtless heard of this tribe from the Mukkaw Indians at Cape Flattery when he was bound southward to find the Columbia River, for he applies the name Queenhythe to the bight inside of Destruction Island.

The spelling of the name in Smithsonian Contributions to Knowledge, 220, is Kwinaiult, Swan.

The Indians of this part of the coast, and thence to Shoalwater Bay, when traveling by canoes along the low, sandy beaches south of Point Grenville, push out into the breakers and keeping between the lines of the two seas that have broken on the beach, pole the canoe parallel with the beach. This peculiar mode is rather apt to excite the fears of those ignorant of what these skilful canoe men can do. The whale-boat of the surveying brig *Fauntleroy* was taken by the Indians from Shoalwater Bay to Gray's Harbor in this manner.

CAPE ELIZABETH.

The coast-line is broken between Point Grenville and Quiniault Point or Cape Elizabeth by the mouth of the Quiniault River already described.

The shore-line from the mouth of the Quiniault runs west for one mile. It has high sandy cliffs with forest to the edge, and at the foot are rocky ledges leading beyond low-water mark.

There is little beach between the Quiniault and Cape Elizabeth.

Point Grenville and Cape Elizabeth are prominent and very important landmarks for the navigator. Approached from the south they appear as one. The cliffs from Point Grenville as far as the Quiniault are dark and composed of hard sandstone and conglomerate.

Cape Elizabeth is, however, more prominent than Point Grenville; the cliffs are higher than at Grenville; the upper parts are yellowish clay and the lower part a kind of sandstone conglomerate.

This cape bears north fifty-three degrees west (NW. $\frac{3}{4}$ W.), distant three and three quarters miles from Point Grenville. It projects barely one mile beyond the general line of the coast. As seen from any direction it presents a bright front of rocky cliffs of fine sandstone crowned with a heavy forest of fir and hemlock. Dark lines in the stratification indicate the dip to be slight to the eastward. The highest part of the cliffs is reached by three short rocky terraces or benches to the edge of the trees, where the height above the sea is two hundred feet, and thence inland there is the usual dense forest of Oregon pine, hemlock, and an almost impenetrable undergrowth. When the Cape is approached from the direction of Gray's Harbor, at a distance of seventeen miles and bearing northwest by north two-thirds north (NW. by N. $\frac{2}{3}$ N.), it shows as the outermost point of land with a steep face and an irregular crest-line of wooded country extending northeastward. Point Grenville is projected upon it half a point to the eastward and below the outline, but seems part of the Cape. Coming nearer, the rocks at Point Grenville are made out faintly, but

*The Northwest Coast. Three years' residence in Washington Territory, 1857.

Cape Elizabeth is the higher and more marked, although a very distant and high line of coast stretches outside of it. When the Cape bears northwest by north one-third north (NW. by N. ½ N.), distant ten miles on the course from Gray's Harbor buoy, the Willoughby Rock inside of Split Rock, distant thirteen and three quarters miles, is seen outside of the farthest faint point.

The general crest-line behind the cape is quite flat, but broken by slight hillocks, wooded, and reaches well to the eastward with Mount Olympus bearing northeast by north and overtopping everything. When a vessel is nearly three miles broad off Point Grenville, the farther rocks stretch outside of the low and very distant point far beyond Cape Elizabeth. The bright rocky line of cliffs under the Cape, and reaching into the mouth of the Quiniault River, are arranged in comparatively low steps, sloping backward and southeastward, and the trees on the outer edge of the Cape cliff stand above all the others. The stratification of the face of the Cape is well marked. The houses of the Quiniault Reservation are visible at the eastern end of this line of cliffs. The cape is a narrow jutting point of cliffs, off which lie three low black rocky and sunken dangers at their outer edge; these lie a little over one-quarter of a mile south of the point. One rock awash at low water and two sunken dangers lie a quarter of a mile inside of the former ones. There are no large or high rocks off the point.

On land the point can be passed at very low tide in smooth weather only, and with much labor in clambering over rocks. At the extreme point the passage is made by going through two long low arches in the jutting cliffs. At extreme low tide there is a very little depth of water in the northern arch.

North of Cape Elizabeth the cliffs have a yellowish appearance and are mainly composed of clay over a rocky base.

There are a few rocks close under the northwest side of the cliffs at the point and one of them is pyramidal or conical, but thence to the northward for three miles the shore is nearly straight and free of outlying dangers.

When the Cape is fully abeam there appear to the northward two steep, wooded cliffs with lower necks behind them, and Arch Islet of the same appearance, distant five to seven miles from the Cape, and nearly abreast Sea Lion Rock. At the same time looking to the east-south-eastward Point Grenville is seen as a vertical faced cliff with the Rock close under the Point a little more than one diameter off, and nearly of equal height with the cliffs, and the Arch Rock half a dozen diameters outside the former. These rocks are projected on a long, low, and nearly level line of distant land extending two-thirds of a point outside Point Grenville, as if it were in the vicinity of the Copalis River.

Outside the Cape the depth of water is ten fathoms over rocky bottom at one and one-third miles, but only a few soundings are given on the reconnaissance sheet (1853).

The geographical position of the extremity of the Cape, as determined by the Coast and Geodetic Survey, is:

Latitude	47° 21′ 11″	north.
Longitude	124° 20′ 01″	west.
Or, in time	8h 17m 20s.1	

In January, 1885, the magnetic variation was 22° 23′ easterly, with an annual increase of 1′.0.

From this Cape the bearings and distances to prominent objects are as follows:

Carroll Islet, off Cape Johnson	N. 45° W.	42 miles.
Destruction Island, proposed Light-house	N. 43° W.	20 miles.
Sea Lion Rock	N. 55° W.	6½ miles.
Outside Buoy, off Gray's Harbor	S. 35° E.	25½ miles.
Cape Shoalwater Light-house	S. 36° E.	40 miles.
The North Head of Cape Disappointment	S. 31° E.	64 miles.

This Cape was first located by the second expedition of Heceta in 1775, when coasting in this vicinity for wood and water. The schooner *Sonora* or *Felicidad*, under command of Don Juan Francisco de la Bodega y Quadra, when running in under shelter of this small cape where there appeared to be a harbor, suddenly shoaled the water from eight fathoms to three fathoms and signaled the danger to the frigate *Santiago*, under Heceta, who ran under Point Grenville and anchored there.

The schooner anchored in the midst of a reef of sunken rocks, and the Indians tried to get her anchor and tow her in towards the village to plunder her. Next day, on July 14, Bodega sent in a boat with seven men; the men were murdered, and the Indians came out to capture the schooner, but were repulsed with the loss of six men. Heceta left the men unrevenged.

Bodega says "that road was found to be in 47° 24′;" in another account he says that . . 47° 26′ he discovered a small bay," etc. The log of the frigate gives the latitude 47° 20′. Manrelle, the pilot under Bodega, places the small promontory (cape) in 47° 23′.

In September of the same year Bodega returned within half a league of the place but could get no information of his boat's crew, and the Cape was named La Punta de los Martires.

In October, 1792, Vancouver anchored four miles off the coast between Point Grenville and this cape, where he had found eighteen fathoms of water on his upward trip, with a [illegible] to the northward. He does not mention this cape, nor does he lay it down on his chart as [illegible], but he has a view of the coast when he was four miles broad off the cliffs to the northward of Cape Elizabeth in which he shows the rocks three or four miles northwestward of the Cape and the arch in the rock off Point Grenville.

Tebenkoff has an anchorage laid down between Cape Elizabeth and Point Grenville, but has no depth and no name. The anchorage may have been used by the Russian otter hunters.

We have heretofore known the head as Point Quiniault from the Indians and the river of the same name; it has recently been named Cape Elizabeth.

THE COAST FROM CAPE ELIZABETH TO DESTRUCTION ISLAND.

In twenty-four miles from Cape Elizabeth to the mouth of the Hoh River, north thirty-four degrees west (N. 34° W.), the coast is nearly straight, receding less than a mile at the middle distance. The shores are low, with rocky cliffs wooded to their edges and broken by small streams. It is inside of the usual course of vessels passing along the coast, but within the first seven miles northwest from Cape Elizabeth there are clusters of outlying rocks in the prolongation of the cliffs of Point Grenville and Cape Elizabeth. These rocks have nearly the same height as the adjacent cliffs and in certain directions and under certain conditions they may not be distinguished in the offing.

For nearly two miles from Cape Elizabeth, the shore is a cliff one hundred feet high, [illegible] nearly straight; at the end of the cliff a small stream breaks through a broad sandy shore; [illegible] at two and one-third miles a second stream breaks through in the same way. There is a broad low-water beach from the Cape to this stream. There is a high wooded bluff between these streams.

Pratt's Cliff.—At three miles from the Cape there is a sharp point with cliffs over one hundred feet high. The low-water beach ends and the shore is rough and rocky.

This point is north thirty-four degrees west (N. 34° W.) from the Cape and the cliffs continue hence for three miles nearly to Raft River.

Off Pratt's Cliff and between it and Cape Elizabeth are several dangers, as follows:

Flat Rock.—One and five-eighths miles north fifty-eight degrees west (N. 58° W.) from Cape Elizabeth is a low black rock, nearly one mile off the shore and half-way towards Split Rock. There is a *break* which shows occasionally even in moderate weather about four hundred [illegible] southerly from it. When seen the vessel's course was three-quarters of a mile to the [illegible] of the Flat Rock.

Half-way between Flat Rock and Cape Elizabeth there is a small low rock directly [illegible] them, and a smaller rock inside and half-way to the shore.

Split Rock.—This rock lies three and one-half miles north fifty-two degrees west (NW. ½ W.) from Cape Elizabeth and one mile broad off the shore at the north part of Pratt's Cliff. It is the outer one of the Split Rock group, which covers an area of one mile long south by west and north by east, by half a mile broad. It is on the line of prolongation of the cliff shore from Point Grenville to Cape Elizabeth. It is one hundred and eighty yards long northwest and southeast, about sixty yards broad, and rises eighty-five feet above the sea; it is visible at a distance of twelve miles. It is split in two, and the division shows when seen from the west to the northward. Close on the outside of this rock there is a low rock, and one hundred and fifty yards [illegible] inside there is another. The Willoughby Rock lies six hundred yards northeast by east from the Split Rock. There are two dangerous rocks in the approach to Split Rock from the southward. The first is a small, low, black rock, lies just a little more than half a mile due south from it; and the second one, somewhat larger, lies nearly half a mile southeast by south from Split Rock. When a vessel is to the northward of Sea Lion Rock and Cape Elizabeth bears east one-half east, Split Rock shows just outside the Cape, and the larger Willoughby Rock inside the Cape; at the same time Sea Lion Rock shows outside of Split Rock. About one mile

one half miles south-southwest from this rock the depth of water is nine fathoms over sandy bottom. We sketched and named this rock in 1867.

The Willoughby Rock.—This is the highest and inside rock of the Split Rock group. It is three-quarters of a mile broad off shore at Pratt's Cliff, and nearly half a mile northeast by north from Split Rock. From Cape Elizabeth it bears northeast, distant three and two-thirds miles. It is nearly round and two hundred yards in diameter, and rises one hundred and twenty-three feet above the sea. The inshore slope of this rock is long; the outer slope is very abrupt. It is dark in color, and is visible at a distance of fifteen miles.

Between this rock and Split Rock, and to the southward of them, there is a cluster of smaller and lower rocks, already mentioned in the description of Split Rock. One of the rocks between the larger ones is conical, with breakers all around it, and a *rock awash*, estimated to be two hundred yards southwest by west from it; another, farther out, is flat, with a small pillar apparently standing out of it. When a vessel is coming from the northwest, and Cape Elizabeth bears southeast one half east (SE. ½ E.), this rock shows black against the higher and lighter land behind the Cape, and Split Rock shows just outside the Cape. Coming from the southward along the coast the Willoughby Rock is the first rock raised, and shows outside and well clear of the distant land beyond Cape Elizabeth. The Willoughby Rock was named in 1887. There are no dangers visible immediately to the northwest of this group.

Sea Lion Rock.—This rock represents the third group northwest from Cape Elizabeth. It lies six and two-thirds miles north fifty-five degrees west (NW. by W.) from that Cape, and two and a half miles broad off Arch Island, which is the nearest shore cliff. It bears south thirty-seven degrees east (SE. ¾ S.), distant thirteen and two-thirds miles, from Destruction Island. It is a low, black rock, about twenty yards in extent and twelve or fifteen feet above water, with a patch of kelp stretching two hundred yards to the southeastward from it. There appears to be plenty of water around it. In the first reconnaissance (1852) the steamer passed half a mile inside of it and found eleven fathoms of water over sandy bottom. In 1869 we passed close to the rock on the outside, and from the number of sea-lions upon it the present name was applied. In 1885 the steamer passed outside, but within two hundred yards of it, and saw no signs of hidden dangers; the weather was clear and calm, with very light swell from the west-northwest.

The rock is plainly visible at eight miles, and shows outside of Split Rock when Cape Elizabeth bears southeast one-half east.

Raft Rock or Arch Island.—For three and a half miles north, thirty degrees west (N. 30° W.) from the south point of Pratt's Cliff, the shore is a nearly straight line of broken cliffs over one hundred feet high, and covered with the usual growth of Oregon pine and hemlock. There are some dangers lying nearly half a mile off the shore, which has a discontinuous and narrow low-water beach. Along this shore there are three small heads which look like three high, rocky, and wooded islets lying close under the shore. They are about one hundred and twenty-five feet above the sea, and the trees make them look much higher. The two southern ones are just half a mile apart, and are projecting cliffs stretching out two hundred and fifty yards from the shore, which is a line of lower, moderately bright cliffs. They have narrow and low necks inside. The northern one is a mile to the northward, and is the largest and slightly the highest. This one is an islet at high water, and stands out from the mouth of the Raft River and the low lands on either side, so that it looks as if it were in the mouth of a small bay. It is three hundred yards long as seen from seaward, and has some high, small rocks under the southwest face, and on the north-northwest, at the distance of one hundred and fifty yards, is a vertical columnar rock one hundred and fourteen feet high. It looks like a spindle when seen from the west-northwest, but when seen from the south-southeast it appears broadside on, and part of it projects just outside the butte.

From this notable islet or butte the Sea Lion Rock lies south fifty degrees west (S. 50° W.) nearly two and two-thirds miles, and there is no known danger between them. The reconnaissance chart of 1852 has eleven fathoms half a mile inside of the Sea Lion Rock. The geographical position of the Islet is:

Latitude	47° 27′ 30″ north.
Longitude	124° 21′ 30″ west.

This Islet has long been known as Raft Rock. In the reconnaissance of 1887 it has been called Arch Island, because there is an arch through one of the two small projections on the south end.

Raft River is a stream rated next to the Quinault in size. Between the points of the entrance behind the rock it is eighty yards wide, but the low-water channel way towards the northwest under the north side of the Raft Rock is not over thirty-five or forty yards wide. Inside, the river expands into several arms, which come through a low, wooded country. This stream may be the Loh'-whilse of the Mukkaws. It is navigable for canoes and small boats for quite a distance at high water. It can be forded at low water.

All the coast above the cliffs near Raft River is wooded, and the hills behind rise to moderate height with a rolling surface densely covered with trees and undergrowth. Over all rises the wild rocky summits of the Olympus Mountains.

From Raft Rock to abreast Destruction Island the shore-line is straight and comparatively low, except near the Queets River, with a low-water beach and only two dangers as much as half a mile from shore.

The Queets River.—From Raft Rock to the mouth of the Queets River the distance is four and one-third miles, and the general direction of the shore northwest by north. The cliffs are a little over one hundred feet in height, and there is a low, narrow, shingle beach under the cliffs. At one and three-quarters miles northward of Raft Rock there is a small stream breaking down the regular line of cliffs. The mouth of the Queets was (in 1887) ten and two-thirds miles north thirty degrees west (N. 30° W.) from Cape Elizabeth and nine and three-quarters miles south fifty-six degrees east (S. 56° E.) from the south point of Destruction Island; and at that time it was larger than any other river between Gray's Harbor and Cape Flattery. The south point of the river is the north termination of the cliffs thence from Raft Rock. At present a sandy spit two hundred and forty yards long, and of irregular width up to one hundred yards, extends to the northwestward parallel with the outer shore line, to the mouth of the stream which is there eight yards wide at high water, and about half that at low water. Thence to the northward for one and one-third miles is a low, narrow, sandy spit with the slack water of the river behind it, forming a long, narrow lagoon. The southern part of this spit is three hundred yards across and has some and deciduous trees on the inner sides. It is evident that the stream has at some time broken under the cliffs at the northern end of the lagoon. Inside the mouth the stream widens to two hundred and fifty yards and comes from the southeastward for three-eighths of a mile, having made a sharp turn from the northward. The eastern side of the river abreast the mouth has low deciduous trees, and no firs.

The lower part could be navigated by small river steamers. It carries a large volume of water and has a strong current. At the mouth it is rapidly cutting into the cement cliff south south point of the entrance. The breakers off the mouth are very heavy.

Southward of the Queets River the beach is smooth and formed by gravel and sand. Northward the shore is very bold and precipitous and composed of very loose shifting worn smooth and rounded.

The cliffs, wherever exposed, are yellowish clay with an occasional exception, where the is conglomerate and of dark color.

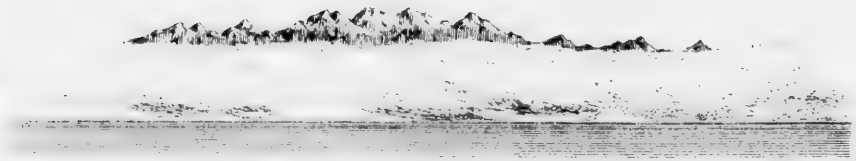
One house is visible at the bend of the river, but the Indian village is half a river on the right bank. The bluff at the south point of the river is in

Latitude	47°	31′	33″ north
Longitude	124°	22′	00″ west

The Chehalis Indians called this river the Kweets'-hu.

From the Queets River to abreast Destruction Island the coast continues in a general direction northwest by north (NW. by N.) for eleven and one-half miles to Abbey Islet. The about fifty feet high, but they are not continuous, and for five miles out of the ten bordering the coast line is low and wooded. There is a narrow beach under the cliffs, low-water beach. Through this low country a stream empties four and one-half miles from the South Cliff of the Queets River. The cliff is broken down for one-fourth of the south point of the entrance is a long, low, sand spit. A few low, flat rocks lie close under beach at six miles north of the Queets River, and the cliffs become rocky for over projects into the sea at several places, thus cutting off the low-water beach. Then continue with a very narrow beach at their base, and the low-water beach is broad. low country the moderately high hills are rolling and covered with fir and cedar and a dense undergrowth.

Point Grenville, E. ¾ N., 19 miles
(land extends to E. ½ S).



Olympus Range, from a point 7 miles SE. by S. from Destruction Island.

DESTRUCTION ISLAND.

This is the only island deserving the appellation north of the Southeast Farallon off San Francisco. It lies less than one mile inside the line joining Cape Elizabeth and Cape Johnson near the deepest part of the bight formed by the easterly recession of the shore. The outer point lies three and a half miles from the nearest shore, and being the same height as the adjacent coast it is very difficult for a vessel to make it out when running along the coast at a distance of ten miles. When it is projected against these cliffs it can only be made out from seaward when there is a hazy atmosphere between it and the shore, or when the sun is shining on the cliffs and the island is in shadow. But when a vessel is running close along the coast from Cape Elizabeth to Cape Johnson it is very distinctly made out.

When the Island bears northwest by north (NW. by N.), seven miles distant, it is seen with a dark line along the level top on the low and fainter outline of the land towards the Quillihute River, and the bright cliffs at the Hoh Head are seen clearly and higher, and hiding the farther land to the northward. When it bears northwest by north four miles distant, the island shows dark against the land towards the Quillihute, but the outline is not quite as high as that land. The cliffs of Hoh Head are bright and high.

With a sharp lookout the island has been seen at a distance of fifteen miles when bearing north by east one-half east (N. by E. $\frac{1}{2}$ E.) as a low, short black line on the horizon, under a low dark line of forest on the shore-line with the hills and mountains rising higher in the interior.

The island is twenty miles north forty-three degrees west (NW. $\frac{1}{6}$ N.) from Cape Elizabeth and nearly twenty-four miles from the Grenville Arch Rock on the same bearing.

It is a nearly level-topped island with an extreme height of ninety feet, covered with a very dense growth of bushes, which have been removed in a few places by the Hoh Indians for planting potatoes. There are only four trees or small clumps of trees on the island, and when seen from the southeast one appears at each extremity of the island, and two nearer the western end.

Vancouver reported a few dwarf trees upon the east end in 1792. The shores are bold, rocky, and very steep, and in some lights show moderately bright below the dark surface line of the bushes.

It is said there are some remarkable perforations through a rock near it, but these are only seen from particular directions. On the eastern end were formerly some rude Indian huts.

The outer limit of the Island is three and one-half miles from the nearest part of the main shore, which, as we have said, here runs straight south thirty degrees east (S. 30° E.) for ten miles.

Its general direction is north-northeast and south-southwest, having an extreme length of nearly half a mile, and its width is about three hundred yards at the widest part, near the southern end.

Towards the north it tapers to a small round point, from which projects a gravelly tongue about two hundred yards long, curving to the northwest. Just beyond this tongue is a ledge sweeping to the westward one-third of a mile, with a few detached rocks awash outside.

Off the northern end of the Island and ledge a number of large detached rocks, with three and five fathoms of water between them, extends in the general direction of the island, nearly a mile from the edge of the bluff. Heavy breakers generally exist throughout this rocky patch.

The western approaches to the island present a very rocky, uneven bottom, entirely unfitted for anchorage, except at such a distance that the island would afford no protection from southerly winds or seas. The ten-fathom line is within three-eighths of a mile of the western shore, with uniform hard bottom outside that distance in eleven and twelve fathoms of water; and very irregular depths inside of it, with two sunken rocks having thirteen and eighteen feet of water upon them.

About two hundred and twenty yards south of the extremity of the reef at the south end of the island, and a quarter of a mile from the island, there is a sunken rock with sixteen feet of water upon it.

The southeastern face of the island is free from sunken rocks, but has broken, irregular bottom. Bordering the base of the cliffs along this shore there is a rocky shelf just under water, and the face of this shelf is almost vertical down to three and five fathoms of water.

South of the line of kelp (which commences off the northeastern part of the island and runs along the eastern face of the detached rocks to the northward) there are five and six fathoms of water very close to the shore. Sandy, sticky, and uniform bottom in ten fathoms of water is

found off the southeast face of the island, at a distance of one-eighth of a mile from shore, and the water appears to deepen only a fathom in a quarter of a mile.

Ninety-four and one-third miles south seventy-eight degrees west (S. 78° W.) from Destruction Island the sounding gives one hundred and eighteen fathoms of water over a bottom of black sand and gravel.

Between the northern end of the reef and the shore to the north-northeast the depth of water is everywhere less than eight fathoms; the soundings are very uniform between nine and ten fathoms to North Rock, one hundred feet high, four and a quarter miles north-northeast from the north end of the island, and one mile from the nearest shore. There is a depth of eighteen fathoms three and a quarter miles south of the island and about three miles south of Destruction Island. Vancouver says he anchored in twenty-one fathoms of water over soft, sandy, and muddy bottom.

The examinations of the Coast Survey have materially reduced the reported size of this reef.

The extent of the island and reefs is one and three-eighths miles north-northeast by one mile in width, and a thorough reconnaissance has developed the fact that it affords no protection against southeast weather; in fact, proximity to the island at such times is dangerous, as Meares experienced in heavy and thick weather from the southward.

Tides.—The average rise and fall of the tides at Destruction Island is seven and three-tenths feet.

The time and height of each tide throughout the year are readily obtained from the tide tables which are published annually.

Find the time and height of the required tides for Astoria, then the time of high water at Destruction Island is forty-two minutes earlier in standard time, or one hour earlier in local time, and the height of the tide nine-tenths of a foot above that given for Astoria; the time of low water is forty-six minutes earlier in standard time, or one hour and four minutes in local time, and the height of the low water two tenths of a foot below that given for Astoria.

Hydrography.—The eastern side of Destruction Island affords the only proper anchorage in the vicinity of the Island.

From one-half to one-quarter miles off it the soundings are quite regular from ten to twelve fathoms, with hard bottom, but inside of that the bottom is broken, but not so badly as elsewhere. No dangerous rocks are found on this side until very close to shore, and in fact were it not for the sea, vessels could lie in places alongside the wall of rock forming the low-water mark. Even on this side is only safe during northerly and northwesterly winds; at the first indication of a southerly wind a vessel should go to sea. The surveying brig *Fauntleroy* had twice to slip her cable once in the middle of the night, when the wind came up suddenly.

The currents off Destruction Island are usually to the northwestward; the surveyors have found this littoral drift.

In 1775 Heceta and Bodega report that in calm weather they found the currents running to the south-southwest in this vicinity.

In April, 1792, Vancouver was compelled to anchor in twenty-one fathoms of water over a bottom of soft sand and mud, with the middle of Destruction Island bearing north, distance one league, and he had the current setting rapidly on shore. This current was drifting his vessel into danger.

Whilst at anchor one day he found "a constant current, without interruption, setting in the line of the coast to the northward at a uniform rate of nearly half a league per hour."

He furthermore states that after passing Cape Orford he had been regularly thus affected, and carried to the northward ten to twelve miles per day farther than was expected.

When a vessel is outside Destruction Island the high land behind Cape Elizabeth is visible with a long depression between two moderately high rounding peaks. This may be the Saddle Hill of Meares; but there are two other hills of equal height close to each other and to the right hill of the Saddle.

There is no bay or harbor between Point Grenville and Cape Flattery with capacity for sheltering vessels. Destruction Island furnishes the only shelter, and is the objective point of all sealing schooners along this coast when they are seeking protection in summer.

The geographical position of the southwest part of the island has been determined by the U. S. Coast and Geodetic Survey; it is:

Latitude	47° 40′ 07″ north.
Longitude	124° 30′ 00″ west.
Or, in time	8h 18m 00s.0.

In January, 1885, the magnetic variation was 22° 35′ east, with a yearly increase of 1′.6.

The following bearings and distances are given to prominent objects from the south part of the Island where it has been proposed to place a Light-house:

Cape Disappointment, North Head	S. 34° E.	83 miles.
Buoy outside Gray's Harbor Bar	S. 39° E.	48 miles.
And this line passes half a mile inside Sea-Lion Rock at thirteen and two-thirds miles; and three-quarters of a mile outside of Split Rock at sixteen and one-half miles		
Cape Elizabeth	S. 43° E.	20 miles.
And the Grenville Arch Rock lies on the same bearing nearly twenty-four miles distant.		
Carroll Islet beyond Cape Johnson	N. 47° W.	22 miles.
And this line passes nearly tangent to James Island at fifteen and one-half miles.		

Heceta (July 14, 1775) says that in 47° 58′ he found la Isla rasa (a flat-topped island) which he named la Isla de los Dolores; and that it was covered with pine trees and was a league in circumference. This has been supposed to apply to Destruction Island; but the description and position are not applicable to it.

It received its present name, by which only it is known on this coast, in 1787, from Captain Berkely of the *Imperial Eagle*, who sent a long boat from King George's Sound to explore as far south as latitude 47°. The officers and crew of a smaller boat entered a shallow river (either the Hoh or the Quillihute) and rowed up some distance, where they were attacked and murdered by the Indians. In 1788 Meares came upon the Island in southeast weather and had great difficulty in weathering it. It was while in the vicinity of this Island that he saw the high land behind Point Quiniault, showing as a saddle.

Vancouver retained Berkely's name and placed it in latitude 47° 37′ north. De Mofras designates it in his general chart I. de Dolores.

In 1852 the coast surveying steamer ran between the Island and the shore on a straight course and found no less than six and one-half fathoms.

The reconnaissance of 1866 shows that a fair passage exists between it and the mainland, and that a course half-way between them will probably carry in no place less than six and one-half fathoms of water; but the locality has not been examined in detail. It was examined tentatively in the hope of finding anchorages against both northwest and southeast winds.

Queenhythe Bay.—This is the name given by Meares to the bight formed by the recession of the shore south of the Quillihute River to a short distance south of Destruction Island which he says lies in the middle of the bay. In want of some special designation we retain the name. Abreast Destruction Island the main shore continues north thirty degrees west (N. 30° W.) from a little south of the Island to the Hoh River, then curves westward for two miles to Hoh Head.

From Hoh Head the two points in line to the northwest are Teahwhit Head and James Island at the Quillihute mouth. They lie north sixty-one degrees west (N. 61° W.) from Hoh Head, the first eight and one-sixth miles the latter ten and three-fifths miles, with Cake Island on the same range two and one-eighth miles beyond.

Between Hoh Head and Teahwhit Head the coast is very irregularly broken and falls back in half a dozen bights about one and three-quarter miles.

The cliffs are moderately high, ranging from fifty to one hundred and fifty feet in height, and all are wooded to their edges. Several small streams break through the line of cliffs. The points are high and jutting, with numerous rocks off each one; some of these rocks are high and notable islets, others are sunken dangers. In this reach from Destruction Island to James Island the shore can not be safely approached nearer than two and a half miles.

The country immediately behind the cliffs of Queenhythe Bay is low, and is quite flat, and when a vessel is nine or ten miles southwest half west (SW. ½ W.) from Destruction Island a great broad, low valley appears immediately beyond the island, and extending as far northward as the Hoh River and well to the southward of the range of the Island. North and south of this wooded valley the hills rise to moderate heights, and are wooded. Beyond are seen the snow-peaks of the Olympus Mountains. One or two small streams break through the cliffs. In the bight, on a line between Destruction Island and Hoh Head, the bottom appears, from the few soundings taken, to be nearly of a unifom depth of ten fathoms. On the line between the Island and the mouth of the Quillihute the depths are eleven, fourteen, and fifteen fathoms, at respectively one, two, and

five miles from the north end of the Island. This fifteen-fathoms sounding lies three miles west from North Rock Point.

Commencing abreast of Destruction Island, we have the descriptions of the following objects:

Abbey Islet.—This is a rocky islet, two hundred yards in diameter, lying close under the cliffs and connected with them at low water. It is three and one-third miles north twenty-seven degrees east (N. 27° E.) from the north end of Destruction Island. The bright cliffs of the south shore are about one hundred feet high, and this islet has the same height and is wooded, but the sides are not bright.

A second and smaller islet with the same characteristics lies two fifths of a mile to the northeast and close under the shore. Between these two there is the mouth of a small stream and a small sand spit forming the south point. The line of soundings between Destruction Island and Abbey Islet shows a maximum depth of seven and three-fourths fathoms over sandy bottom midway.

The name "Queen Hythe" is found on Arrowsmith's chart of 1798 abreast of Destruction Island.

Abbey Islet was named in 1866 by the U. S. Coast Survey from its appearance.

South Rock.—A trifle over one mile to the southward of Abbey Islet and half a mile outside the cliffs there is a small black rock standing forty-six feet out of water, with three fathoms of water close outside of it. It lies very nearly two and one-half miles north forty-three degrees east (N. 43° E.) from the north end of Destruction Island.

The deepest water between it and the Island is seven fathoms, a little nearer the rock than the Island.

North Rock.—This is a black rock about one hundred and fifty yards long and forty yards wide, lying southeast and northwest, with nearly vertical sides. It is one hundred feet above the sea, with deep water close under its southeast face, where a depth of four fathoms is found sixty yards from the face of the cliff. It lies four and one-fourth miles north eighteen degrees west (N. 18° W.) from the north end of Destruction Island, and one and one-sixth miles south thirty degrees west (S. 30° W.) from Hoh Head.

It is sometimes made out quite plainly when projected against the whitish, broken cliffs northwest and southeast of the small bay under the Head.

Between it and Destruction Island the depth of water is nine to ten fathoms over regular bottom.

Middle Rock.—This is a black rock fifty yards in extent and forty feet high, with nearly vertical sides. It lies a little over half a mile from the cliffs on the north side of Hoh River, and one mile north seventy-eight degrees east (N. 78° E.) from North Rock.

It is four and one-third miles north three degrees west (N. 3° W.) from the north end of Destruction Island. Two-thirds of a mile outside this rock there is a *rock awash* at low water on the direct line to Destruction Island. Between it and the shore are many low, flat rocks. There are no soundings given in this vicinity.

The Hoh River.—The mouth of this small stream lies four and two thirds miles north forty degrees east (N. 4° E.) from Destruction Island. It is in the deepest part of the bight of Queen's Bay. It is marked by the Middle Rocks already described, and by the break down in the cliffs for two-fifths of a mile; this is well noted from a distance. There is a broad sand beach north of the opening, the south point is a small sand point, and the north is a long sand beach. Slight evidences of the stream breaking through in different places in different seasons. In 1858 the mouth was eighty yards wide at high water, and forty at low water, but inside the entrance it widens to one hundred and fifty yards, and again decreases in a quarter of a mile; it is reported to have a swift current. The river drains a broad, flat valley with wooded hills to the north and to the south. The Indian village at the mouth, on the south point under the cliffs, is named Kwaak-sat.

The river can be navigated by small river steamers at its lower part. It is a swift running stream with a large volume of water and can not be forded near its mouth. There is a *sunken rock* visible at the lowest tides directly off its mouth; it is one mile from the shore and almost exactly a mile south sixty-three degrees east (S. 63° E.) from North Rock.

At the south side of the mouth of the river is the Hoh village of six buildings. In the south weather the Indians go in and out of the river with canoes. As the outer breakers are quite heavy the Indians generally keep inside of them by tracking their canoes in the surf until they are sheltered by the rocks that are one mile to the northwestward of the entrance, and then put out to sea.

Two views of Destruction Island and adjacent coast. Rock. Rock. Rock. NE. by N. ½ N.

Destruction Island, 90 feet, NW. by N., 7 miles. Hooch or Hoh Head. Abbey Island Head.

Quilliyute Island. Destruction Island, 90 feet, NW. by N., 4 miles. Hooch or Hoh Head

Hooch River Valley, N., 4½ miles.

Huntington Rock,
135 feet.

Quilliyute Island.

212 feet.

Rounded Island, 129 feet.

Perkins R

Hooch River Valley.

Destruction Island, 90 fe

Abbey Island Head, NE. by N. ¼ N., 3 miles

Perkins Reef.

Alexander Island, 121 feet.

North Rock, 100 feet.

Hooch or Hoh Head, NNW., 5¼ miles

ley. Destruction Island, 90 feet. NE. ¼ E., 9 miles.

The beach south of Hoh River can be traveled for many miles.

The Middle Rock lies two-thirds of a mile west-southwest from the present mouth.

At present the name of the River is pronounced Hoh by the Indians living there. In 1857–1866 they pronounced it Hooch (*ch* as in German *ich*), or Hooh.

By some it is believed that this was the place where two of the officers and four men of the *Imperial Eagle*, Captain Berkley, were murdered in 1787.

Hoh Head.—This is the high bright cliff lying five and one-half miles north twenty degrees west (N. 20° W.) from the north end of Destruction Island.

The bright part of the cliff is over two hundred feet high and is covered with a dense fir forest, stretching inland over moderately low rolling hills. It juts out over half a mile beyond the general curve of the shore, and has bright cliffs to the north and to the southeast one mile, where there is a shallow bay half a mile broad with high and low water beaches. The bright cliffs do not follow this bay, but the bluff is high and covered with fir. When Destruction Island bears northwest by north seven miles distant, and this point twelve miles away, the bright cliff is seen a little more than a width of Destruction Island to the eastward, and James Island at Quillihute Point two or three widths of the Island to the westward. Over the bright cliffs of Abbey Island the hills are seen at their highest point.

This slightly projecting head is bold and conspicuous from along the shores; the color is dark and the material conglomerate; the cliffs on the seaward face are impassable. North of the head the shore can be walked and climbed, with certain detours through the forest. The cliffs, except at the head, are yellowish clay. There might be anchorage under Hoh Head, but the approaches are filled with low *sunken rocks*, stretching out as far as one mile south by west from the head. Other rocks lie between it and the North Rock, and a large cluster lies off the South Cliff of the shallow bay.

The Perkins Reef, two hundred yards in extent, lies one and one eighth miles west half south (W. ½ S.) from the head. It is large and jagged.

Between this reef and the shore is a visible rock and two sunken rocks near it. It is a dangerous locality. Perkins reef is a low, bald islet about twenty feet above the sea.

Three and one-half miles west from Hoh Head the depth of water is fifteen fathoms, and hence to Destruction Island the bottom is quite uniform after passing North Rock.

The geographical position of the extremity of Hoh Head, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47	45	47	north.
Longitude	124	29	35	west.

The nearest points to the northwest are Teahwhit Head, eight and one-third miles north sixty-one degrees west (N. 61° W.), and the high and notable James Island, just southeast of the Quillihute River on the same bearing and ten and two-thirds miles distant.

Chah latt Creek.—Two miles north northwest from Hoh Head, in the bight of Alexander Island, the cliff is broken down by the passage of the Chah-latt Creek, a very small stream with narrow sand spits on either side, and a bluff behind the south spit. This stream can be forded.

The bright cliffs are broken down and wooded for half a mile south of the creek; to the northward they continue bright and unbroken for three miles, and rise to one hundred and one hundred and twenty feet above the water, with beaches here and there. The outline is much broken, and small heads and outlying rocky islets, wooded above their steep sides, line the shore at distances reaching one and a half miles from the shore. These peculiar islets range from one hundred and fifteen to twenty-five feet.

Alexander Island.—This moderately high, bare island lies just two miles north fifty-five degrees west (N. 55° W.) from Hoh Head and seven and two thirds miles north twenty-seven degrees west (N. 27° W.) from the south point of Destruction Island. Although this Island is far inside the usual courses of vessels on the Coast, and has visible and hidden dangers outside of it, yet it is a very recognized object from seaward.

Its greatest length is four hundred and fifty yards west-northwest and east-southeast and its breadth about one hundred and eighty yards. It is one hundred and twenty-one feet above the sea, bare and nearly flat-topped with steep sides. Although but one mile from the shore, yet in hazy and smoky weather it is seen standing out prominently from the brighter cliffs as it were a long distance from the shore. It is smaller but very similar to Destruction Island in general appearance. There are three *sunken rocks* in a cluster nearly a half mile south of the islet. One

and one-eighth miles north sixty-seven degrees west (N. 67° W.) from the north point of [illegible]; there is a *rock awash* at low water, and half-way between it and the islet is a small rock [illegible] five feet high. Inside and to the northward of this danger are two small rocky masses [illegible] forty-four and the other seventy-four feet high.

The *Keh-chen-ichilt River* is a small stream breaking through the cliffs about one and [illegible] fourths miles northwest by north from Alexander Island. It breaks sharply through the [illegible].

It is about one mile east of To-le-ak Point. It empties between two cliffs which are [illegible] one hundred feet high and covered with forests to the edge, so that the river is inaccessible from the beaches outside. A short distance above its mouth the stream divides into two streams, neither of which is navigable. On the westerly tributary there is a beautiful waterfall.

TO-LE-AK POINT AND ROUNDED ISLAND.

Ten miles north thirty-four degrees west (N. 34° W.) from the south point of Destruction Island there is a small narrow point with a knob at the extremity, a sharp slope to seaward, and a gentle slope to the neck inside. Outside of this is a great bare reef with a high wooded islet one hundred and twenty-five yards in extent, as the western limit. There are two houses on the point.

From the approaches by land this point with its outlying rocks is quite prominent, [illegible] so much so as the headlands to the northwestward.

Close under the south side of the extremity of the point where the cliff breaks down there are two Indian huts where the Indians land their canoes in moderate weather. This place is full of sunken rocks and rocks awash, and it is dangerous to approach in rough weather.

The point is well marked by *Rounded Island*, which is a grassy rock nearly round, one hundred yards in diameter and one hundred and twenty-nine feet high; it has very steep sides.

It lies only half a mile outside of To-le-ak Point, but is readily recognized from seaward. Two-thirds of a mile south by east (S. by E.) from it there is a low black rock forty or fifty yards in extent.

Rounded Island is ten miles north thirty-eight degrees west (N. 38° W.) from the south point of Destruction Island.

The Giants Graveyard.—This is a group or cluster of rocks, some bare and some wooded on top, rising from eighty-eight to two hundred and twelve feet above the sea. They lie close to the high, wooded bluffs which reach northward for three miles from near the Keh-chen-ichilt River. One resembles a church, another is double-peaked, etc. They reach out nearly half a mile from the beach, and the farthest danger is three-quarters of a mile from shore. They are not inside the course of any vessel.

It is believed that it was in this immediate vicinity that a Spanish vessel was wrecked and all of the persons upon her except nine men and one woman were massacred. The survivors were taken into slavery. At Quinaiult, in 1887, the grandson of the chief present at that massacre was still living as an old man called Capitan. His father and grandfather bore the same name, and it had a distinct connection with the tragedy.

Teahwhit Head.—This is a sharp, bold, but not prominent point, lying inside the line between Destruction Island and James Island. It lies thirteen miles north forty-four degrees west (N. 44° W.) from the south point of Destruction Island, and two and a half miles south sixty one degrees east (S. 61° E.) from James Island. It is an irregular, jagged, double point, reaching out [illegible] a mile from the general curve of the coast-line. Each point is narrow and precipitous, with a knife-edge on top, which is one hundred feet high; behind these sharp cliffs the point rises to one hundred and fifty feet high, and heavily wooded behind the dead trees on the front edge.

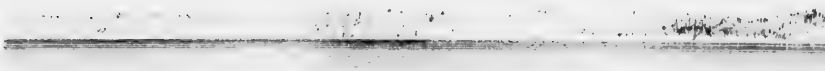
The cliff is composed of dark conglomerate. There are no known dangers immediately off this point.

The Indian name is Te-ah'whit (accent on ah'), which, in the Chinook jargon, signifies [illegible].

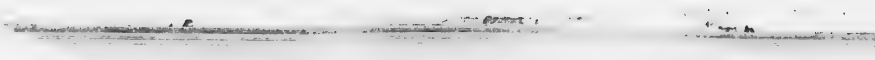
The Huntington Rock.—Half-way between Teahwhit Head and James Island, at the mouth of Quillihute River, there is a very jagged cliff stretching out slightly from the line of wooded cliffs. Two-thirds of a mile off these bare cliffs is a cluster of seven high rocky islets, seven low rocks and a sunken rock. Two of the inner islets have heights of one hundred and ninety-two and one hundred and twenty-three feet, and the latter islet is wooded.

Huntington Island is the outermost large islet and is about one hundred and eighty yards in extent, has nearly vertical sides, a flat top, and bare; it is one hundred and thirty-five feet high. Stretching one-third mile southeastward from Huntington Islet is a line of rocks; two of the [illegible]

Destruction Island,



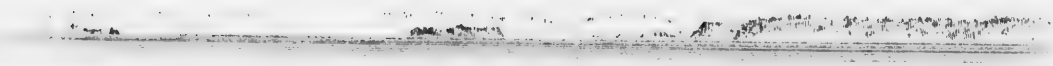
Three views of Coast, approaching the Quilli



Mountains of Vancouver Island. Cake Island, Hu...
Carroll Rock, 200 feet. Cape Johnson
Pinnacle Rock, 126 feet. Cape Flattery, NNW., 38 miles.

Destruction Island, 90 feet, N. by E. ¼ E., 15 miles.

of Coast, approaching the Quilliyute River from the Southeast.



Quilliyute Island and River, N. ¼ W., 10 miles.

Mountains of Va
Carter's Rock, 200 fee
Pinnacle Rock, 126 feet. Cape

seven and seventy three feet high, three are low and black, and a third high one called the Quillihute Needle is the most distant. It is not over thirty-five feet in diameter and is eighty-three feet in height, standing up nearly vertical to the sharp apex. To the northwest of the Huntington Rock there are five low black rocks reaching out one-quarter of a mile and one sunken rock beyond the outermost one.

THE QUILLIHUTE RIVER.

From Hoh Head to the mouth of this River the general direction of the coast-line is north-northwest west half west (NW. by W. ½ W.) for ten and two-thirds miles. Just north of Hoh Head the shore recedes to the northeastward of the above course nearly two miles and is guarded by many rocks and rocky islets already described.

The entrance to the River is readily made out by the remarkable peninsula at the south side of the River.

This peninsula is a high rocky head formed, in fact, of one large and three smaller islets, having high steep cliffs around each one and covered with Oregon pine. The larger one is slightly the lower and rises probably one hundred and twenty-five feet above the sea. The larger islet and two of the smaller ones are connected with the mainland by a low-water isthmus; the third is a little outside. At the time of the land survey the islets were attached to the main shore by low sandy isthmuses, but in 1887 they were as described. These notable landmarks are very readily recognized because the shore-line behind them for nearly a mile to the northwest and a mile to the southeast is a broad, bare sandy beach, and the valley of the Quillihute River, although heavily wooded, is low and flat, and recedes somewhat.

The largest islet, now called James Island, is fifteen and one-half miles north forty-seven degrees west (N. 47° W.) from the south point of Destruction Island, and three and three quarters miles south thirty-eight degrees east (S. 38° E.) from Cape Johnson. It is well inside all the prominent high islets along this part of the coast, although there are no known outlying dangers. James Island is high, bold, and wooded, and is connected with the mainland at low water. The southern islets of this head overlap each other, as seen when a vessel is broad off shore, and they are not quite so high as the southern and larger islet. In the seaward face of the larger one and at the southern part there is a cave which we noticed in 1867. Inside of these islets there is a peninsula of two sand dunes three-quarters of a mile long north and south. Behind this is a large lagoon forming part of the river basin which opens to the northward under the high wooded bluffs. Sometimes the river has opened to the southward.

Inside of this long sand waste, and at its southern part, the shore is low and grassy with a mound twenty feet high just in from the high-water mark. On the ocean side and face of this mound is the Indian village of Lapush. On the top are the traders' house and stores. Two hundred yards behind the village is the edge of the forest.

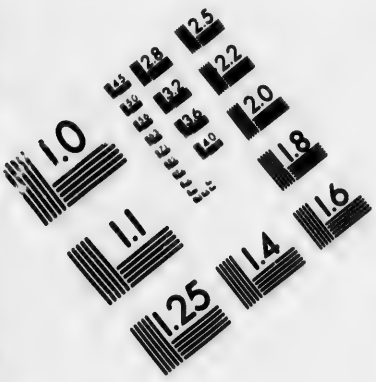
At the time of the land survey the mouth of the river was two hundred and fifty yards wide and the depth of water five to six feet. Subsequently the width of the river, half a mile inside, was reported to be seventy yards with a swift current.

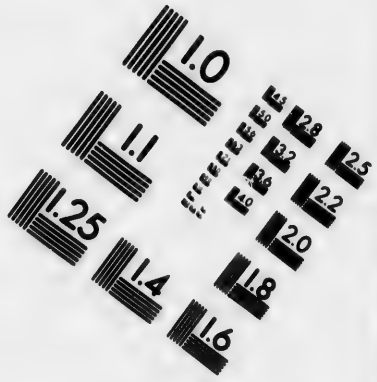
In 1887 the river, as it entered the ocean, was only sixty-five yards wide, but inside of this was the large lagoon, and into the lagoon the combined mouths of the Quillihute and Dickodoch-tedar Rivers entered.

Their combined width was three hundred and eighty yards, the Dickodoch-tedar being about 3 yards.

The Cove under James Island, or Quillihute Head, affords a slight shelter in northwest winds three and one half to four fathoms water over sandy bottom. In such weather the Indians launch their canoes in this cove. In southeast weather they land on the outer beach north of the head. The cove is three-quarters of a mile wide from James Island southeast by east to the ragged cliffs abreast of Huntington Rock, and is half a mile deep to a long, broad, sandy beach with a low back country forming part of the valley of the Quillihute River. There are no known dangers in this cove, and it has been used by otter hunters and traders.

When a vessel is a short distance off the coast abreast Quillihute, the smoke from the village is seen against the dark green of the fir covered hills beyond. When James Island bears north one-half west, ten miles distant, it is seen as a low, long, black islet with higher wooded land beyond and the still farther off and higher mountains. Immediately southeast of it is the dark, low, wooded point forming the south side of the River, and still farther southeast the Teahwhit Head.





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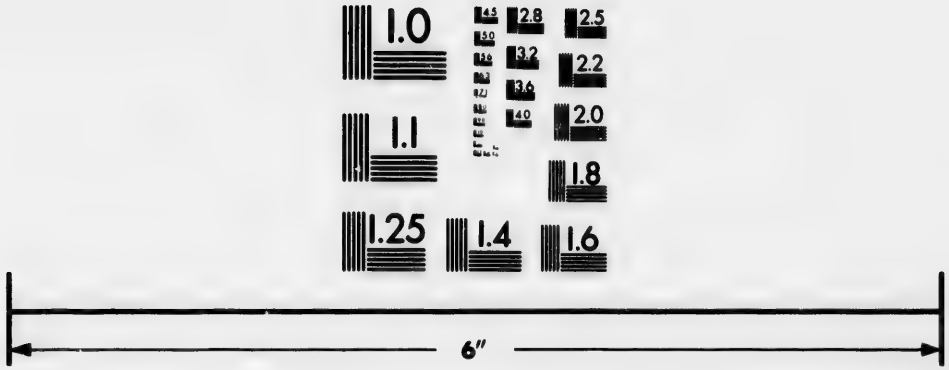

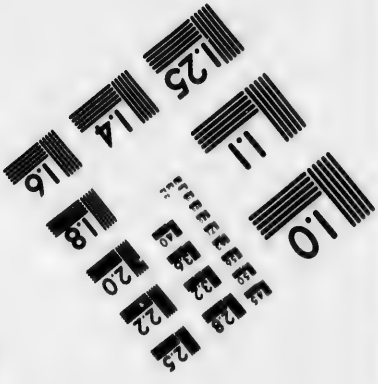

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From the same point of view, outside of the Island are seen the hills of Cape Flattery, beyond which and much higher extend the high mountains of Vancouver Island with Carroll Island under the western point thereof and Pinnacle Rock close on its outer side. But when James Island is seen bearing north-northeast six miles, it stands out well defined as two Islets, the smaller appearing close on the west of the larger, and both nearly as high as the wooded hills beyond. A low gap appears on the east side of the head, and then steep, wooded shores.

We passed within two miles of these rocks in 1867.

Outside of these landmarks are seen on the horizon Cape Flattery at a distance of thirteen miles, with Carroll and other rocks near Cape Johnson inside, and the Flattery rocks outside. One mile outside of these rocky and wooded Islets the reconnaissance chart of 1852 gives soundings in seventeen and eighteen fathoms of water over sandy bottom.

The geographical position of the western point of James Island, or Quillihute Head, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47	54′ 08″	north.
Longitude	124	39′ 32″	west.
Or, in time	8h	18m 38s.1	

In January, 1885, the magnetic variation was 22° 35′ east, with a yearly increase of 1′.0

The Quillihute is the largest river emptying upon the seaboard of Washington Territory.

It rises fifteen miles to the north-northeast, under the high flanking masses of the Olympus Mountain, that reach probably a height of five thousand feet. There are three branches, of which the northernmost enters the Quillihute nearly at the mouth.

The lower part of the river can be navigated by small river steamers. It has a strong current and such volume of water that it can not be forded. At one time it emptied between James Island and the Quillihute village.

The schooner connected with the trading post anchors in the cove east of James Island in smooth weather; if a swell comes up she is compelled to seek an offing.

The cliffs of the Quillihute Islets are precipitous and composed of a dark conglomerate.

There is a good site for a life-saving station here.

The river was first known as the Kwil-leh-yut by the Chehalis Indians, and the Kwineetul or Kwi dee-tul by the Mukkaws. The tribe occupying this river speak a language entirely distinct from the Mukkaws and the Tsi-heh-lis. We believe this is the river where the crew and officers of one of the exploring boats of the *Imperial Eagle* under Captain Berkely were murdered in 1787.

In the Smithsonian Contributions to Knowledge, 220, it is referred to as Kwille'yute four times; in 1857 it was written Kwil-leh'-yute by Gibbs; on the Chart, 603, it is Quil-ley-ute, and this is used until 1879, when it is given on the General Land-Office map as Quillyhute. On present coast chart it is Quillihute.

The Indian village we have mentioned is very likely the stockaded village referred to by Meares in July, 1788.

> But though the village of Queenhithe was obscured from our view, we could plainly discern the town of Quillett, which is distant from it about seven or eight miles. It is situated on a high perpendicular rock, and is by a narrow and impregnable causeway, twenty feet in height to the mainland, which is an entire forest. our glasses we observed a multitude of houses scattered over the face of the rock.

Tebenkoff designates the Quillihute as the Bay and River of the Martyrs. De Mofras uses the same name. The Indian Agent at Quiniault informs us (1887) that the Indian village was formerly located as described by Meares.

North of the Quillihute River the shore-line has a narrow low-water beach, and a narrow high-water beach under the steep wooded bluffs for two miles to the northwest. Two-thirds of a mile above the Quillihute, a very small stream breaks down the bluff, but it does not cut its way through the beaches.

Cake Rock.—Two and one-eighth miles north sixty-three degrees west (N. 63° W.) from the notable heads at the mouth of the Quillihute River, there is a large, flat, rocky islet standing off and a third miles from the shore. It presents the same appearance from all directions, and is a conspicuous landmark known to all the masters of vessels on this coast.

It is two hundred yards long northwest and southeast, one hundred yards broad, and one hundred and sixteen feet in height, with very steep sides and a regular and grassy top which rises into a slight round mound in the middle about twenty feet high. Half-way between it and the nearest shore is a jagged rocky mass of nearly the same area and rising to one hundred and

Quillayute Island and River, NNE., 6 miles.

Flattery Rocks, 21 miles. Carroll Island, 200 feet. Cake Island, 116 feet.

Cape Flattery, N. by W. ¾ W., 33 miles.

Cape Johnson, 8¼ miles.

thirty one feet above the sea. When seen from the north end of Destruction Island, Cake Island is seen outside of Huntington Rock (one hundred and thirty-five feet high) and the Quillihute Heads or James Island.

It lies seventeen and one-half miles north forty-eight degrees west (N. 48° W.) from the south end of Destruction Island and four and two-thirds miles south forty two degrees east (S. 42° E.) from Carroll Island. From all appearances there is deep water around this islet. The nearest outlying danger is a large, low, black rock, one and one-eighth miles north twenty-nine degrees west (N. 29° W.) from it, one mile from the very rocky shore, and one and one-eighth of a mile south one-half west (S. ½ W.) from Cape Johnson.

The reconnaissance sheet of 1852 gives a depth of seventeen fathoms over sandy bottom, half a mile outside this islet. We passed within three fourths of a mile of it in 1867.

In the edition of the Coast Pilot in 1869 this rock was called Table Rock.

Three high rocky pillars lie from one-half to one mile south-southeast of Cape Johnson and respectively reach elevations of one hundred and seventeen, two hundred and nine, and one hundred and twenty-five feet.

CAPE JOHNSON.

This is a very small head, hardly breaking the long curve from Teahwit Head to Flattery Rocks. It can not be well made out by the vessels passing it on the direct line from the Strait of Fuca to San Francisco. When a vessel is bound northwestward from the Columbia River or Shoalwater Bay, or Gray's Bay, this head will stand out as a low point just beyond James Island with low and very gently rising land to the eastward. From the northwestward a vessel will see it projected upon James Island, and therefore it is not readily recognized, except that it is the first one of the high cliffs south of Flattery Rocks. The head does not project half a mile beyond the general curve of the adjacent shores northwest and southeast of it, but it presents a nearly vertical, bare, rocky cliff to seaward, with Oregon pine on the top and a mass of rocks off the base, cutting away all low and high water beaches.

There are several high rocks, the highest ones one hundred and three feet and one hundred and twenty-seven feet high, reaching out half a mile to the west-northwest. Immediately outside of these there are no known hidden dangers. But between it and Cake Rock there is a cluster of low, black rocks, and to the northwestward on the line to Bald Island there are two clusters about a mile from the coast.

Outside of the Bald Island is Carroll Island and Jagged Island, two and one-half miles west by north (W. by N.) from the Cape, and over two miles from the shore.

The cliffs in the vicinity of the cape are formed of clay and conglomerate.

The geographical position of Cape Johnson, as determined by the U. S. Coast and Geodetic Survey, is as follows:

Latitude	47	57′	52″ north.
Longitude	124	41	02 west.
Or, in time	8h	18m	44s.1.

In January, 1885, the magnetic variation was 22° 38′ east, and increasing at the rate of 0′.8 yearly; but the variation has nearly reached its maximum limit.

From Cape Johnson the following bearings and distances are given to important objects:

Umatilla Reef, two and a half miles off the Flattery Rocks	N. 41 W.	13¾ miles.
The south point of Destruction Island, over Quillihute Head	S. 46 E.	19 miles.
Buoy off Gray's Harbor	S. 41° E.	66¼ miles.
Cape Shoalwater Light-house	S. 39 E.	79 miles.
North Head of Cape Disappointment	S. 35 E.	103 miles.

There is great confusion of names among the old navigators in this vicinity, arising because no marked cape existed, while so many of the large rocky islets had similar general characteristics.

Northward of Cape Johnson to the Flattery Rocks the bright cliffs are seen only in short lines; the coast-line is nearly of the same height, but the slopes of the bluffs are covered with Oregon pine or hemlock to the line of high water. There are a few low-water sand beaches, but the shore is generally bounded by a very rocky beach, sometimes reaching out nearly one-third of a mile. Outside of the shore-line the rocks and rocky islets extend from one to two miles, and this part of the coast must not be approached nearer than three miles. The country behind rises moderately but irregularly for ten or fifteen miles, and then begins to form the flanking wooded mountains of the Olympus range.

Jagged Islet.—This is a large, black, bare islet of irregular outline, four hundred and six yards long north and south, and one hundred and twenty yards wide. It rises at the highest point to sixty-eight feet above the sea, and there appears to be no outlying dangers. From Cape Johnson it lies two hundred and seventy-three miles west by north (W. by N.), and from the highest and outermost Flattery Rock it is eleven and one-quarter miles south thirty degrees east (S. 30° E.). There is a small, low, black rock two hundred yards north of it towards Carroll Islet.

Carroll Islet.—This is a very notable rocky islet, two hundred and sixty yards long north and south, and two hundred yards broad. It has nearly vertical light colored sides, and rises over two hundred feet above the sea. The top is wooded with Oregon pine. On the southeast side, at two hundred yards distant, is a small, low, black rock. The islet is partly noticeable when seen in the sunlight, and is sometimes erroneously called the Quillihute Rock, thus confounding it with the Quillihute Needle. On the west side, at the distance of one hundred and seventy-five yards, there is a pinnacle rock which rises to one hundred and twenty-six feet elevation. There are no known outlying dangers near Carroll Islet, and half a mile outside of it the reconnaissance sheet of 1852 gives a depth of nineteen fathoms of water over sand bottom. On the latest chart there is a depth of seventy-six fathoms over fine black sand and mud, seventeen miles west northwest from this islet. The nearest large danger to this islet is Jagged Islet, seven-eighths of a mile south one half east, and to the northward is the Hand Rock, one and five-eighths miles north fourteen degrees west (N. 14° W.). The Islet is very nearly three miles north sixty-three degrees west (N. 63° W.) from Cape Johnson, and ten and two-fifths miles south thirty-one degrees east (S. 31° E.) from the outermost and highest Flattery Rock. It lies one and three-quarters miles broad off shore, and inside of it lie the Bald Islands. Inside of Carroll Islet, towards the northeast, are small, low, black rocks, the nearest one being three-quarters of a mile distant. The shore abreast these dangers is very rocky and dangerous.

DEEP-SEA SOUNDINGS.

A line of off-shore soundings was run by the United States Steamer *Tuscarora* in October 17, 18, 19, 20, 1873, as follows:

Distance and bearing from Carroll Islet.	Latitude.	Longitude.	Depth (fathoms).	Temperature of water (Fahrenheit).	Character of bottom.
Miles.	° ′	° ′			
18 S. 68 W.	48 00	125 10	76		Fine black sand and mud
28 S. 39 W.	47 47	125 20	118		Black sand and gravel.
33 S. 40½ W.	47 45	125 27	360	38.9	Clay, with fine dark sand.
38 S. 42½ W.	47 43	125 37	570		
45 S. 43½ W.	47 41	125 45	623		Clay, with fine sand.
50 S. 42½ W.	47 39	125 53	780		Greenish mud and fine sand.
54 S. 43 W.	47 37	125 59	700		Ooze and clay
67 S. 43½ W.	47 32	126 14	1,063		Brown mud and ooze.
78 S. 42 W.	47 25	126 28	1,304		Clay, mud, and ooze.
92 S. 38½ W.	47 14	126 42	1,387		Light-brown mud and ooze.
111 S. 36½ W.	47 01	127 04	1,385		Blue clay and brown mud mixed.
143 S. 36½ W.	46 44	127 42	1,492		Ooze and brown mud.
196 S. 36½ W.	46 44	128 48	1,535	35.0	Clay, brown mud, and ooze.

The geographical position of this Islet, as determined by the U. S. Coast and Geodet Survey, is:

Latitude	48	00	06	north.
Longitude	124	43	53	west.
Or, in time	8h	18m	55s.5.	

In January, 1885, the magnetic variation was 22° 40′ east, and the annual increase about 9′. The variation has nearly reached its maximum range.

Bald Islets.—Inside of Jagged Islet and Carroll Islet lie two high islets nearly three-quarters of a mile from the shore. The outer one is two hundred and sixty yards long east and west, and one hundred and forty yards wide; it is two hundred and forty-seven feet high, with steep sides, bare, rocky, and rough looking. About two hundred yards southeast of its eastern end there is a smaller islet about one hundred and twenty five yards in extent, and one hundred and seventy five feet high; it is bare, and rocky, and forbidding. Between these two Bald islets are two

pinnacle rocks close together. Two thirds of a mile south-southeast from Bald islets there is a cluster of small, low, black rocks, and between the larger one and the bluff point to the northeastward, there are four or five small, low, black rocks. To the northwestward there are several small black rocks nearly a mile distant. These are the rocks lying between Carroll islet and the point to the northwestward of the latter.

Hand Rock.—This is quite a small rock about forty yards in extent and rises to twenty-seven feet elevation. It lies one and one-half miles north thirteen degrees west (N. 13° W.) from Carroll Islet, and is one and one-half miles broad off the shore, with another rock slightly larger and forty feet high half-way inside. Nearly one mile north by east from the Hand Rock is a low, black rock half way to the shore to the northward. In the northwestward and the southeastward Hand Rock shows as a hand with a finger pointing up from it.

Behind the shore between Cape Johnson and Cape Alava the country is quite low, but very densely wooded with Oregon pine and hemlock, with a thick underbrush. One or two miles inside the shore line lies the Lake of the Sun, which is reported to be ten miles long and two miles wide, with its length parallel to the shore. This lake empties through the Tsoyes or Osette River.

North of Carroll islet the shore slightly recedes for a little more than a mile, and in the deepest recess a small stream comes to the shore, but does not cut through the beach.

In three or four miles the shore line is bordered by a line of rock extending out as far as one-third of a mile in latitude 48° 05½′ north.

White Rock.—Two miles south-southeast (S. SE.) from the northern part of Cape Alava and in line to the southeast with Osette Island and the Northwest Flattery Rocks, this notable rock rises to an elevation of one hundred and sixty-two feet. It is one hundred yards in extent with nearly vertical sides and a rounding, treeless top, and only three-quarters of a mile off the shore.

When seen from the southward the white sides of this rock show well against the dark pine forests of the main shore.

It is seven and three-quarters miles north twenty-five degrees west (N. 25° W.) from Carroll Islet, and two and three-quarters miles south forty-nine degrees east (S. 49° E.) from the Northwest Flattery Rock.

In a recent publication this white rock is erroneously placed three miles to the southeastward of Flattery Rock.

Three-quarters of a mile south southeast from it there is a cluster of large, low, black rocks lying three-quarters of a mile from an islet-like head on the nearest shore.

And on the same bearing, one and one-half miles distant, there is a small, low, black rock.

CAPE ALAVA.

This is the westernmost point of the mainland of the Pacific Coast of the United States south of Alaska. The coast-line between the Quillihute Head and Cape Flattery makes a general but flat curve to the westward, with a deep bay under Flattery, which helps to bring out Cape Alava. This Cape has an ocean front of about one mile north-northwest and south-southeast. For two hundred yards the rising bluff is apparently grass covered and the highest part wooded; thence eastward the land is flat and rises very slowly.

The northwesternmost point of the Cape is marked by a rocky islet one hundred and forty yards in extent, and rising by steep sides to one hundred and eighteen feet above the water. It is grass covered except towards the eastern edge, where there are a few fir trees. From the southeast side there is a low spit which reaches within seventy-five yards of the low rocky beach from the point.

When the Cape is seen from the south-southeast at twenty miles distant, it is made as a low flat tongue of land lying under the higher hills and Cape Flattery thirteen miles beyond it.

Outside of the low point lie the Flattery Rocks. And on the same bearing and at the same distance Cake Rock stands out black and broad, with Carroll Islet and its Pinnacle mate looming up boldly. Between Cake Rock and Carroll Islet is seen the low flat land of Cape Johnson.

Cape Alava with its timbered islets is sometimes mistaken for Cape Flattery.

The beach, with a few minor interruptions, can be traversed on foot.

There is the site for a life station near the village.

The Cape is well marked by the Flattery Rocks, which forbid an approach to it, and the shore is bordered for one-third of a mile with innumerable rocks above and below water. To the south the shore runs southeast one-half degree east (SE. ½° E.) for four miles; to the northward it runs

north for three and one-half miles, in which latter broad bight there commences at one ... half miles a fair low-water beach under a narrow high-water beach, with wooded low ... hind. This low-water beach is two and one-third miles long, with no known dangers off ... length of two miles.

The geographical position of the north part of the Osett village at the northern part ... Alava is:

Latitude	48	10	00 north.
Longitude	124	44	16 west.
Or, in time	8h	18m	57s.4.

The magnetic variation was 22° 50′ east in January, 1885, and increasing annually about ... The easterly variation has very nearly reached its greatest limit.

From this Cape the following bearings and distances to important objects are given:

North Head of Cape Disappointment	S.	35 E.	115 miles.
Cape Johnson	S.	31 E.	124 miles.
Tatoosh Island Light-house	S.	23 W.	13¾ miles.
Umatilla Reef, outside the Flattery Rocks	West.		2¼ miles.

On the northwestern part of Cape Alava, on the slope of the green hillside, is the O... lage of the Indians. It was formerly stockaded, as we passed close outside in 1867 and ha... view of it. The village has over twenty houses, and is now bulk-headed to prevent the in... the sea (1887). The Indian name of the village is Hosel'to, strongly aspirating the *h*.

The landing on the beach is protected by a partially wooded islet one hundred and fifteen fe... high, under which the Indians pass through the vast number of rocks. Outside of it ... wreck of the *Austria* (1887).

On the 22d of March, 1778, Cook, having been driven seaward by heavy gales off Cape ... weather, made the land about latitude 47° 05′ and ran to the northward, with fair wind ... west and west-northwest. At seven in the evening he says he was

> in forty-eight fathoms of water, and about four leagues from the land, which extended from North to South... East, and a small round hill, which had the appearance of an island, bore North three-quarters East, dist... seven leagues, as I guessed; it appears to be of tolerable height, and was but just to be seen from the deck. ... this island or rock and the northern extreme of land there appeared to be a small opening, which flatter... the hopes of finding an harbor. These hopes lessened as we drew near; and, at last, we had some reason to ... the opening was closed by low land. On this account I called the point of land to the North of it *Cap*... It lies in latitude 48° 15′. There is a round hill of moderate height over it, etc. (Vol. II, p. 263.)

Before next day he had a hard gale from the southwest, accompanied by rain, and he ... see land again until he reached latitude 49½°. He jumped at the conclusion that the ... Strait of Fuca did not exist. On some of the English Admiralty Charts the name Cape ... has been placed in the position of the Flattery Rocks, but Vancouver adopted the present ... on this coast.

From an examination of Cook's account, with a knowledge of the currents, etc., we ... vinced that he was fully as high as Latitude 47° 55′; the small round hill or Island was the ... tery Rocks on with each other, and the point to the northward of them was Cape Flattery ... he placed, by estimation, eight miles too far south.

The Cape was named Alava on Kellett's chart of 1847.

THE FLATTERY ROCKS.

This is the most marked group of rocky islets north of the Farallones off San Francis... Although they do not extend far off shore, yet they are the westernmost land of the United ... south of Alaska. They are in the direct route of all vessels bound to and from the Strait of ... whether to ports in Puget Sound or to Victoria and the Gulf of Georgia.

The whole group comprises a line of rocks and islets parallel with the coast, beginning ... and one-third miles south of Cape Alava and reaching two and one-quarter miles beyond it. ... southern rocks are about three-quarters of a mile off shore, but the extreme northwest exten... the low cluster of the Umatilla reef exactly west from the Cape.

White Rock southward of the Cape has already been described.

Osett Island.—This is the largest islet of the Flattery group; it is half a mile long ... northwest and east southeast, and about one-fifth of a mile broad. It has very steep, rocky ... broken down somewhat on the south face, but the full height of the island to the west. It ap... nearly flat-topped and is two hundred and forty feet above the sea, with irregular clusters of

trees alive and burnt. In the early reconnaissance the trees were all living. The largest clump of trees is near the southeast end. The outer or western end of the island is one and one-eighth miles south thirty five degrees west (S. 35° W.) from the north part of Cape Alava. On the south and southeast face there are low-lying black rocks one third of a mile from the islet; inside of it the rocks from the Cape reach within one-third of a mile, or half way towards it. The Indian name of the Island is Hosett'.

Smithsonian Contributions to Knowledge, 220, says, p. 2, 6. Hosett: p. 105, Ho-seth the village at Flattery Rocks. The Indians aspirate the *o* very strongly.

Tsa-ko-luh Islets.—These are the two large and highest outlying islets of the Flattery group, being farther out than the Osett island. The outer islet is somewhat the larger, being three hundred and twenty-five yards long east and west and one hundred and seventy five broad. The inner one is only one hundred and twenty yards from it towards the Cape and is two hundred and seventy yards long east and west and one hundred and sixty-five yards broad. These islets have high, bold, and bare rocky ocean fronts, with gradually sloping surfaces towards the shore. The front of the outer islet is two hundred and fifty feet high and of the inner one two hundred and thirty feet. Both are covered with Oregon pine, and on the lower parts by ferns and bushes. Close under the southwest angle of the outer islet there is a high, bare rock separated from the islet by a very narrow waterway. Two hundred yards outside the outer islet is a small rock about fifty yards in extent, but rising to one hundred and seventy five feet elevation. Two smaller rocks are outside of this one to the west, low and black, and one to the north somewhat higher. Between these islets and the Cape the water appears deep for half a mile and then the rocks, which are very numerous, reach to the shore-line of the Cape.

The outer end of this larger islet is one and one third of a mile south eighty-five degrees west (S. 85° W.) from the north point of the Cape Alava.

The geographical position of the western point of this outer islet, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	48°	10′	24″ north.
Longitude	124°	46′	10″ west.
Or, in time	8h	19m	04s.7.

From the western point of this outer Islet of the Flattery Rocks we have the following bearings and distances to important objects:

Cape Orford Light-house	S. 23°	E.	320 miles.
North Head of Cape Disappointment	S. 35°	E.	116 miles.
Carroll Islet	S. 31°	E.	101 miles.
Tatoosh Island Light-house	N. 18°	W.	12½ miles.
Cape Beale Light-house, Vancouver Island	N. 48°	W.	42 miles.

The Umatilla Reef.—In some respects this is the greatest danger on the northern coast, because in thick weather it is a very difficult object to make out, and in the heavy gales and long stormy nights of winter a vessel approaching it from the southward has probably had no departure for three hundred and twenty miles when passing Cape Orford Light-house. The extent of this reef is two hundred and twenty yards east and west and about seventy-five yards wide.

It shows one low black rocky head about sixty yards in extent, and three other very small ones, together with three points of breaks, one being close on the inner side of the visible rocks. The outer edge of the reef lies one mile and one hundred yards north eighty-four degree west (N. 84° W.) from the outer limit of the westernmost Flattery Rock or islet; and there is a passage way of half a mile wide between the reef and the outlying low black rock off that islet. Through this passage the Coast Survey Steamer passed in the reconnaissance of 1852, with soundings of twenty-nine, ten, and twenty fathoms, keeping nearer the inner islet, but the irregularities of the depths show clearly the foul character of the bottom. One mile outside of the Umatilla Reef there is a sounding in twenty-seven fathoms over fine sandy bottom. This Reef lies twelve and one-half miles south thirteen degrees east (S. 13° E.) from the Tatoosh Island Light-house.

There are no known dangers to the west of it and none to the north of it for four miles.

Steam-ships bound northward to the Strait of Fuca, or southward therefrom, lay a course to pass four or five miles to the westward of the Umatilla reef, although there are no known hidden dangers outside of it.

Umatilla Reef—Whistling Buoy.—A *second-class Whistling Buoy* painted *red* and lettered "*Umatilla Reef*" in white has been established off the Umatilla Reef. It is moored in twenty-four and a half fathoms of water.

From the buoy the following bearings and distances are given to prominent objects:

Cape Flattery Light-house	N. ¼ W.	13 miles.
Umatilla Reef	NE. by E. ½ E.	1¾ miles.
Osett Island, South Side	E. ½ S.	
And the nearest part of the Island is distant		3¼ miles.
Carroll Island	SE.	11¼ miles.

This buoy was established April 11, 1889.

The Flattery Rocks are erroneously described in a recent publication as "a group of [illegible] able bare, rugged islets," whereas they are wooded.

The Flattery Rocks were first noted by Cook in 1778, but not named; in 1792 Vancouver gave them their present designation. They were called by De Mofras the Islas de Descados, and by Tebenkoff the Is. de Deskados.

Osett River.—This is a small stream opening one and one-fifth of a mile to the northward and east of the Cape Alava, where the rough, rocky shores break down and a sandy and bowlder water beach commences. The valley is moderately wide but heavily wooded like the rest of the country. Some years since it was estimated to be fifty yards wide at the mouth, with a swift current and steeply sloping banks. There was then a village at the mouth, but in 1887 there was none, and the stream was not over twenty yards wide. The Indian name of the river is Hoseh, strongly aspirating the *h* (1861).

This is the river which drains the Osett Lake, known on the Territorial maps by the fanciful name of the Lake of the Sun, already mentioned. There are a few settlers on its shores. The lake is irregular in shape, with small coves, points, etc. It was first examined in 1861, and known as Swan's Lake; the Indian name is Ka'-ouk, meaning a body of fresh water, or simply a lake. The river does not go far inland, but runs nearly parallel with the coast from the southward. It is not a navigable stream, and can be forded at low tide.

FROM FLATTERY ROCKS TO CAPE FLATTERY.

From Cape Alava the coast-line continues nearly north for four and one-half miles, and then falls to the eastward three miles to form Mukkaw Bay, whence it runs out well to the westward as far as Cape Flattery. The shore-line is irregular, with alternate stretches of wooded bluffs and rough, rocky cliffs from one hundred to two hundred feet high. The country immediately back of the shore is not high, but after a few miles the hills ascend sharply towards the east, and are heavily wooded with pine and hemlock, and are almost impenetrable on account of the dense undergrowth.

The Point of Arches.—From Cape Alava the first three miles of the shore is a somewhat irregular wooded bluff rising to over one hundred feet. It is bordered by good low-water and high-water beaches, both narrow and the former interrupted. At four and one-half miles [illegible] seven degrees west (N. 7° W.) from the high islet at the northern limit of the Cape the shore is broken by high, bold, rocky cliffs for one and one-half miles. These cliffs are formed of a coarse dark conglomerate.

The forest reaches to the edge of the cliffs. At their bases there is neither low nor high-water beach, but many high rocks and islets are closely clustered around them. Some of these stretches for three-quarters of a mile. The southern one is the *Father and Son;* the former is the outside rock and rises to one hundred and sixty-three feet, the smaller one, connected by a low black reef is [illegible] feet on the eastern edge. They lie five-eighths of a mile off the nearest cliffs, and are three and three-eighths of a mile north eight degrees west (N. 8° W.) from the northern point of the Cape. There are no known hidden dangers around them. One mile north-northwest from these rocks is a rock forty feet high, nearly half a mile off the cliffs, with a dozen rocks between it and the shore. *Spike Rock,* which has sometimes been called Sail Rock, northernmost of these rocks off the Point of Arches. It is a small, sharp, bare rock forty-two feet high, standing seven-eighths of a mile north eighty-one degrees west (N. 81° W.) from the point. Between it and the point are three large, high, rocky islets; the first reaches to one hundred and sixty-four feet elevation, is grassy topped and marked by a pinnacle one hundred and eight feet high on the inner side; the second is grass covered on top and reaches one hundred and seventy feet above the sea; the third is one hundred and fifty-two feet high and has grass and a few pines upon it. There are three arches in these islets. One-third of a mile south forty-one degrees west (S. 41° W.) from Spike Rock, there is a *rock awash* at low water. This danger is one mile off shore and four and one-quarter miles north eight degrees west (N. 8° W.) from Umatilla Reef. It is well inside the course of all vessels.

Half a mile north of the westernmost part of this point there is a very small head at the extremity of a narrow point separating the bare cliffs on the south from the wooded bluff on the north; through this narrow point there are two arches.

There has been no hydrographic survey off this point, but a single sounding of twenty-five fathoms of water over fine sandy bottom is given four miles outside the point.

The westernmost part of this cape lies nine and one-quarter miles south thirty-three degrees east (S. 33° E.) from Tatoosh Island Light-house, and it is in

Latitude	48°	14′ 10″	north.
Longitude	124°	42′ 33″	west.

This cape is probably that which De Mofras has named the Point Martinez.

Portage Head.—For nearly two miles to the northward of the Point of Arches, the shore-line is a wooded bluff over one hundred feet high. It curves to the eastward slightly and has a fine low water beach and a narrow high-water beach to the commencement of the irregular rocky cliffs of Portage Head. These cliffs are bold, irregular, over one hundred feet high, formed of a coarse, dark conglomerate, and covered with wood. The head has a little over one mile frontage, and runs nearly north-northwest and south-southeast. The extreme northern part of the head is formed by two high tongues, with steep sides, and fern covered tops.

Inside of it the shore runs to the northeast for three-quarters of a mile to the low beach and peninsula of the Tsoo-e-ez River.

The boldest part of the head lies exactly north from the outer high Flattery Rock at a distance of seven and two-thirds miles. It is nearly six and two-thirds miles south forty-three degrees east (S. 43° E.) from Tatoosh Island Light-house.

Dangers.—Off the north end of the point and stretching nearly one and one half miles towards Tatoosh Island Light-house there are several low, black rocks awash at low water, some sunken, and one small one forty-four feet high.

Mukkaw Bay.—The southeast point of this bay is Portage Head; the northwest point is Wa-atch Point. The westernmost parts of these points lie north thirty-three degrees west (N. 33° W.) and south thirty-three degrees east (S. 33° E.) from each other, three miles apart; east from this line the depth of the bay is one and one-quarter miles. The southern half of the bay has numerous rocks, low and sunken, reaching out one and one half miles northwest from Portage Head, and therefore the approaches are dangerous. The innermost rock is forty-four feet above water.

The water in the bay is not very deep but vessels can anchor in northerly and easterly weather with safety, provided there is not too much sea.

The southern part of the bay is bordered by a long, broad, low-water beach, and a low, sandy high-water beach which forms a long, narrow peninsula to the mouth of the Tsoo-e-ez[*] River, which comes in from the southeastward. This peninsula is sandy on the outside and grassy on the river side; the narrowest part is only fifty yards across, but it widens to the northward, and reaches out to a small, rocky head with numerous low, black rocks for one-quarter of a mile outside; near this narrow part of the peninsula and under the north end of a forty-feet cliff are three Indian houses. At the mouth of the river there is a short piece of cliff sixty feet high and the south side is a broad, sandy point, with a few pines upon it. The width of the river is eighty yards, but decreases to fifty yards behind the Indian houses. It has a swift current and it can not be forded at the mouth, but can be forded about one mile above its mouth at extreme low tides. The lower part of this stream is navigable for small boats and canoes. It has a good volume of water.

There is a very broad, sandy low-water beach off the south point of the entrance. Behind the long peninsula of the Tsoo-e-ez the forest retreats for more than half a mile.

Mukkaw Bay was called Nisco Bay on Kellett's chart of 1847, but no name is given on the later editions.

Wa-atch[†] *Slough.*—This sluggish stream, seventy yards wide at the mouth, opens under the east side of the Wa-atch point. It has a broad, smooth sand beach for over a mile to the southeast as far as the cliff on the north side of the Tsoo-e ez River. It is simply a tidal slough which is fordable almost anywhere at low tide.

[*] *Tsooes.*—Smithsonian Contributions to Knowledge, 220, pp. 2, 6, Tsuces; p. 105, Tsoo-ess, the village on the Tsooyes River near its mouth; p. 105, Tsów-iss, the Rock at the mouth of the river on its Southwest side; p. 105, Tsoo-yéscha-uk, the River flowing past the Tsoooss village.

[†] Wa tch Slough, name. Smithsonian Contributions to Knowledge, 220, p. 2, 6, calls it Wäatch; on page 105, Wa-atch, the village at mouth of Wäatch Creek.

The Wa-atch Slough comes from the northeastward for three miles through a low, marshy track lying between Nee-ah Bay and the head of Mukkaw Bay. The head of this slough is within two hundred yards of the low beach at Nee-ah Bay, and a rise of tide of twenty feet would make the high land of Cape Flattery an island.

This creek or slough is used by the outer coast Indians during the prevalence of heavy winter gales, when the passage outside and around the cape is impracticable. It can be forded near its mouth at low water.

The Indian village of the Wa-atch Indians is on the north shore of the slough at the mouth. It is used as a winter habitation.

Wa-atch Point.—This forms the north point of the Mukkaw Bay. It is a broad irregular point facing south, and forms the southeast extremity of the long line of rocky cliffs from Cape Flattery. It terminates in bold, rocky cliffs over one hundred feet high, and covered with pines to their edges. There are no outlying rocks off it to the westward, the farthest being about four hundred yards from the southern cliffs. Off the extreme southeast point there is a line of low rocks extending out one sixth of a mile and forming a good protection to the mouth of Wa-atch Slough. And half-way from the point to the rocky head near the Tsoo-e-ez River there is a reef of low, black rocks. In a straight line this point is three and seven-eighths miles southeast by east (SE. by E.) from the Tatoosh Island Light-house.

This point is almost exactly north of the Umatilla Reef and ten and one-quarter miles distant.

No hydrography has been done in this section of the coast, and therefore it must be avoided; there is one sounding of twenty-eight fathoms of water over sandy bottom about four miles south by east (S. by E.) from Totoosh Island Light-house. It is in the reconnaissance of 1852, and another of thirty-four fathoms over fine dark sand is given two miles farther out.

From Wa-atch Point to Cape Flattery the distance is only three miles and the course west-northwest, with no outlying rocks for two miles. The shores are rocky and high cliffs, formed of coarse, dark conglomerate with low, rough, rocky projections in places. There is no beach except at a mile and a half from the point, where there is a good sandy low-water beach under the cliffs, and near the southern end of the cliffs there is a high-water beach and a slightly retreating bluff under which are five Indian houses visible from the water. This is the summer village of the Wa-atch Indians, and is known as the Arch-a-wat.*

From half a mile westward of the Arch-a-wat Indian village it is impossible to walk or climb.

From one mile south-southeast of the westernmost point of the Cape there is a series of moderately high, rocky masses which reach out three-eighths of a mile. There are four principal rocks south of Fuca's Pillar, seventy-one, forty-one, forty-five, and eighty-eight feet high, with a few small, low, black rocks around them.

THE COAST-LINE.

From Point Grenville to Cape Flattery the country bordering the coast is moderately low and densely wooded, but within ten miles the hills begin to merge into the flanking high mountains of the Olympus Range. All the hills are covered with forests, and on account of the undergrowth the country is nearly impassable. The shore was inhabited by numerous tribes of Indians accustomed to war, and for more than a century they were bitterly hostile to the white people of all nations. They are far superior to the Indians found along the southern coast. Their villages were heavily stockaded, and the houses made of cedar boards which they had cut, with great industry and rude tools, from the trees. We have measured them and found some of these boards four feet wide and twenty feet long, the outside edges being about one inch thick and the middle three inches. Their houses were very large, and are partitioned into stalls for each family. The numerous streams emptying upon the coast afforded them a never-failing supply of the finest salmon, and the forests abound in large game.

They are fearless in their canoes, and to obtain means for barter with the white traders they attack and capture the different species of whale moving along the seaboard, and are adept hunters for the sea otter.

At the present time the tribes are settled in Reservations laid off by the Government of the United States at the Quiniault River, and from Mukkaw Bay to Nee-ah Bay.

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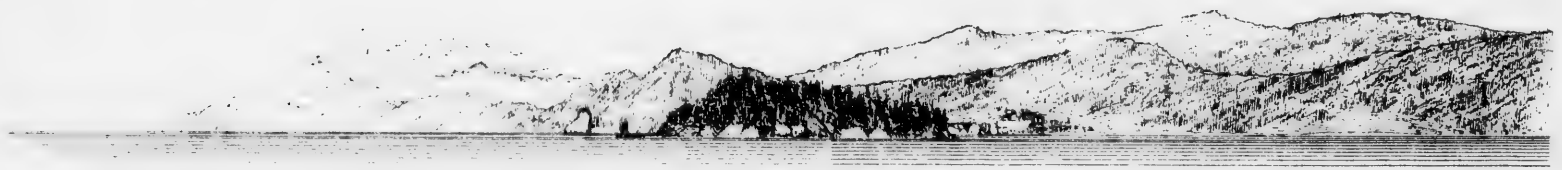
*Arch-a-wat. Indian village, name. Smithsonian Contributions to Knowledge, 220, spells it Ahchawat; 6; Gibbs named it Hatch-a-wat.

Cape Flattery. Fuca Pillar. Tatoosh Island Light-house, 88E., 2¼ miles. Duncan Rock.



Pillar Point. Clallam Bay. Sekou Point. Kydaka Point. Seal Rock. Wa-ad-dah Island, E. by S. ½ S., 3¼ miles. Indian Agency. Neeah Bay. Village.
Slip Point. Ba-ad-ah Point.

Seal Rock, 200 feet, S., 1¼ miles.

Inner Rock, 120 feet,
S., 1¼ miles.

Duncan Rock.

Tatoosh Island Light-house,
NE. ¼ N., 6½ miles.

Cape Flattery.

Fuca Pillar, NE. ¼ N., 6¼ miles.

Wa-ad-dah Island.

Tatoosh Island Light-house,
E. by S. ¼ S., 7¼ miles.

Cape Flattery.

Duncan Rock.

Fuca Pillar, 140 feet.

Cape Flattery.

Tatoosh Island Light-house, SE., 3¼ miles.

Flattery Rocks, S.SE., 16 miles.

LANDFALLS.

In approaching the coast just northward of Cape Disappointment there is a long range of hills visible about thirty miles from seaward, and made out long before Cape Disappointment is in sight. The position of the culminating part of this range is not yet accurately laid down. It lies northward of Shoalwater Bay and northeastward of Cape Disappointment.

Mount Olympus.—From Gray's Harbor to Cape Flattery the most prominent landfall is the snow-clad mass of Olympus, occupying the greater part of the great Peninsula of Washington Territory, between Hood's Canal, the Fuca Strait, and the ocean towards Gray's Harbor. Overlooking Hood's canal it reaches seven thousand seven hundred and seventy-seven feet elevation in Mount Constance, and towards the west it falls only to four thousand feet within twenty miles northeast of Tatoosh Island Light-house.

The numerous high mountains are massed over a large area with the culminating peaks probably fifty miles east one half south from the Flattery Rocks and thirty-five miles north-northeast from Cape Elizabeth. The center of the mass is approximately in

Latitude	47	50′ north.
Longitude	122	40′ west.

In eight months of the year this great landfall is covered with snow, which lies in the gorges and valleys nearly the whole summer. It attains an elevation of about eight thousand two hundred feet, but it has never been reached, as the cañons are densely wooded and almost impenetrable with underbrush.

It was first seen by Don Juan Peréz,* Pilot and Ensign in the Royal Navy, in the frigate *Santiago*, on the 9th of August, 1774. When he made the land he saw this high mountain covered with snow, and the great mass appeared isolated with a low wooded country on all sides and, judging from the smoke, inhabited.

He placed it in latitude 48° 05′ north, and called it La Sierra Santa Rosalia; but the account of his voyage was not published until ten years after Vancouver's first voyage.

It was next described by Meares in July, 1788, and placed in 47° 10′, the error arising from his supposing it to be much nearer the coast line than it actually is upon the single bearing which he observed. In his sketch it is marked quite close to the shore in latitude 47° 14′ north. He called it Mount Olympus, the only name by which it is known. In 1792 Vancouver determined its position approximately and gave the latitude 47° 50′ north. In 1841 The United States Exploring Expedition placed it in latitude 47° 45′ north. The Indian name of the range is Smah"-dik't.

One of the western outlying peaks of this range, of four thousand feet elevation, is placed twenty miles east by south three-quarters south from Tatoosh Island Light-house. It therefore lies fourteen miles east by north one-half north from Flattery Rocks and twenty miles north by east from the Quillihute River.

THE ENTRANCE TO THE STRAIT OF JUAN DE FUCA.

TATOOSH ISLAND.

This island is the northwesternmost land of Washington Territory and lies off the southwest point of the entrance to the strait of Juan de Fuca. It is half a mile west-northwest from the nearest part of Cape Flattery. There is one main islet nearly one quarter of a mile in extent, and three small ones and several reefs awash close on the west-northwest face. It is nearly flat-topped and without trees, but is now distinguished by the Light-house buildings upon it. The surface is one hundred and eight feet above high water, and the sides are nearly vertical. The entire mass is composed of coarse sandstone conglomerate with an outcrop of basalt on one of the reefs. There is a depth of two or three feet of soil upon the top, which was formerly cultivated by the Indians (1852), who resorted here in summer about one hundred and fifty strong, and had several houses near the only boat-landing on the inside of the islet. A reef extends a quarter

*His account is as follows: "Latitude 48° 09′, saw the land. Here was seen a high mountain, covered with snow, which appeared like an island in the distance. It is called *Santa Rosalia*, and is reckoned to be in 48° 05′, August 9, 1774." And again: "A mountain notable for being isolated, and on all sides the country was low and well wooded, and, judging from the smoke, it is inhabited. Latitude 48° 07′."

of a mile off the westward side of the islet, and the whole extent of the islets and reefs is one half a mile in length west-northwest by one-third of a mile in width. Deep water is found upon all sides, except between the islet and the cape, where a reef exists upon which the swell breaks heavily in bad weather. We have been informed that small vessels have gone through the passage when jammed by an unfavorable wind. In so doing great risk must have been incurred, the currents in the vicinity run very irregularly and strong. When approached from the southward this passage looks as wide as the extent of the Island.

The Fuca Pillar.—From the top of Tatoosh island a leaning rocky column one hundred and forty feet high and fifty feet in diameter is seen nine tenths of a mile south thirty eight degrees east (S. 38° E.) from the Light house, and only one hundred and twenty yards from the cliffs, which are one hundred and twenty feet high. It is just one-quarter of a mile south southeast from the westernmost point of the cape. It shows well when a vessel is approaching Tatoosh Island from the northwestward, and is last seen from the Strait of Fuca when the face of the rock is just open by the eastern tangent of Tatoosh Island. At that time the pillar fills one-third of the apparent gap, and the top leans half its breadth to seaward. It is seen just over the island and only disappears when it bears southeast three-quarters east (SE. ¾ E.) over the extreme outer reef of Tatoosh Island. It is a trifle higher than the black rocky cliff just northward of it. It was called the Pinnacle Rock by Meares in June, 1788.

In Smithsonian Contributions to Knowledge, 220, p. 86, the pillar is named Tsa-tsa-dux, bears to the northwest; is sixty feet diameter at the base, decreases to a few yards at the top, which is covered with low stunted bushes and grass. It is inaccessible, except on the southeast side. On page 106 it is called Tsar tsar-dark.

THE TATOOSH ISLAND LIGHT-HOUSE, CAPE FLATTERY.

This structure is erected on the highest part of the island towards the northwestern part.

The Light house is just ninety yards southeast from the extreme western point of the outer islet, and twenty-five yards in from the edge of the cliff, which is here ninety-seven feet above the sea.

It consists of a keeper's dwelling of gray sandstone, with a tower of brick whitewashed rising above it, and surmounted by a balustrade and an iron lantern painted black. The tower is the frustum of a cone. The light was first exhibited December 28, 1857, and shows every night from sunset to sunrise a *fixed white light (with red ray)* of the first order of Fresnel.

It illuminates (264°) two hundred and sixty four degrees of the horizon and the limits of the arc of visibility extend from south sixteen degrees east (S. 16° E., round by the south, west, and north to north sixty-eight degrees east (N. 68° E.), including Vancouver Island. To the southward this limit passes tangent to Flattery Rocks, and a vessel will see it faintly or lose it before going ashore. Into the Strait it passes nearly tangent between Tatoosh Island and Neeah Bay. The height of the focal plane is sixty four feet above the base of the tower and one hundred and sixty two feet above the mean level of the sea.

On the 11th of October, 1887, a *red ray* was introduced into the *white light* to cover the position and approaches to Duncan and Duntze Rocks. These dangers lie in the axis or middle of this red ray, which embraces 7° 15′, approximately, between its outer limits. It subtends from N. 31° W. to N. 38° W. The white ray is not seen in the space covered by the red ray.

Duncan's Rock is one mile from the Light-house and Duntze Rock one and a quarter miles.

It will happen that when the atmosphere is thick or smoky the red ray will not penetrate a long distance seaward, and vessels must therefore be prepared for this condition and its consequences.

In clear weather the light should be seen from a height of—

10 feet at a distance of 18.2 miles,
20 feet at a distance of 19.7 miles,
30 feet at a distance of 20.9 miles,
60 feet at a distance of 23.5 miles,

so that a vessel from the southward will make it ten miles before making the Flattery Rocks.

The geographical position of the Light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	48° 23′ 15″.5 north.
Longitude	124° 44′ 55″.21 west.
Or, in time	8ʰ 19ᵐ 59ˢ.7.

on January, 1855, the magnetic variation was 23° 09′ east, and had a yearly increase of 0′.4, ... easterly variation has nearly reached its greatest range.

There are other buildings on the island connected with the Light-house; one is twenty-five ... to the northeast.

This light is also known as the Cape Flattery Light-house.

STEAM FOG-SIGNAL ON TATOOSH ISLAND.

About thirty yards to the northwestward of the Light-house is the building containing the ... fog signal. The sounding apparatus is a twelve-inch steam-whistle, which is sounded during ... and foggy weather *every* minute; the *blasts are eight seconds long* and the *intervals fifty-two* ... It was established November 1, 1872, but was first sounded July 19, 1873.

From Tatoosh Island Light-house we have the following bearings and distances to important ...

Cape Orford Light-house	S. 23	E.	333 miles.
Cape Gregory Light-house	S. 25	E.	303½ miles.
Yaquina Heads Light-house (not intervisible)	S. 29	E.	224 miles.
Tillamook Rock Light-house (not intervisible)	S. 33½	E.	150 miles.
Cape Disappointment Light-house (not intervisible)	S. 35	E.	129½ miles.
Carroll Islet, north of Cape Johnson, over Cape Alava	S. 24	E.	23 miles.
Umatilla Reef, off the Flattery Rocks	S. 16	E.	12½ miles.
Cape Beale Light-house, Barclay Sound, Vancouver Island	N. 61	W.	30½ miles.
Point Bonilla, Vancouver Island	N. 22	W.	12½ miles.
Owen Point, Port San Juan, Vancouver Island	N. 23	E.	13 miles.
Race Rocks Light-house (not intervisible)	N. 72	E.	18½ miles.
Koitlah Point, West side Neeah Bay (not intervisible)	N. 71	E.	3¼ miles.

A telegraph line has been established between Port Townsend and Tatoosh Island via Port Angeles. From the Island weather reports are sent to all places on Puget Sound for the information of ship masters.

The present name of the island is that given to us when we were here three months in 1852, by the Indian Tribe (the Muk-kaws)* inhabiting the shores of Neeah Bay, the cape and the ocean shore some distance southward. Their name to designate an island is opichuk't.

The British Admiralty chart, No. 1911, calls the island Tatooch.

On June 29, 1788, Meares, passing the entrance to the strait, hove-to off this island, was visited by the Indians, and sent an officer to examine it, who reported that it was a "solid rock covered with a little verdure, and surrounded by breakers in every direction." They also "saw a very remarkable rock that wore the appearance of an obelisk, and stood at some distance from the island." To this rock he gave the name of Pinnacle Rock. It is the columnar, leaning rock already described as the Fuca Pillar. He says that—

> The island itself appeared to be a barren rock, almost inaccessible, and of no great extent; but the surface of ... as far as we could see, was covered with inhabitants, who were gazing at the ship. * * * The chief ... spot, whose name is Tatooche, did us the favor of a visit, and so surly and forbidding a ch... ter we had not yet seen.

The Indians evidently gave him the name of the island, which he mistook for that of the chief. His sketch of the island and cape also includes Rock Duncan.

In August, 1788, Duncan called this Green Island or To Touches.

Too too-tche is the Nootka name for the "Thunderbird."† The Mukkaws originally came from the west coast of Vancouver Island.

Smithsonian Contributions to Knowledge, 220, p. 1, calls the Island Tatooche; p. 60, Tatoosh; p. 105 it says Chardi is the name of the island, which is also called Opa-jecta; and p. 60, Opa-jek-ta.

Smithsonian Contributions to Knowledge, 220, gives the name of the Thunderbird, p. 7, Thlu-klûts.

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* *Muk kaw.*—Smithsonian Contributions to Knowledge, 220, p. 1, spells the name Makah, or more properly Mak-kah. Page 105 it says the tribal name of the Muk-kaws is Kwe-nait-che-chat.

† Too-tooch is a mighty supernatural bird dwelling aloft and far away. The flap of his wings makes the thunder (Too-tah) and his tongue is the forked lightning; he is the survivor of four birds which once dwelt in the land of the How-chuk-lis-ahts in the Alberni Canal, three of which were killed by Quaw-te-aht. (Scenes and Studies of Savage Life, p. 177, Sproat, London, 1868.)

ROCK DUNCAN.

This is a small, low, black rock, rising above the highest tides, but always washed by the western swell which breaks over it. Deep water is found close around it.

The rock is one mile (N. 35° W.) from Tatoosh Island Light house; it is in the *red ray* shown from the Light house.

Many vessels pass between this rock and Tatoosh Island, as the chart shows twenty-five fathoms in the passage; but a rock has been reported in the channel, and it would be well to avoid it until the doubt is set at rest. Vancouver's vessels passed between them. The rock was noticed by Mr. Duncan in August, 1788, and placed in latitude 48° 37′ north, which Vancouver, who gave it the present name, considered a typographical error. It is in latitude 48° 24½′.

During a three months' stay at Neeah Harbor, in 1852, we tried upon several occasions to land upon this rock with canoes, but could never effect our object.

In 1878 a *sunken rock* was reported by the steam tug *Blakely* lying two hundred and fifty to three hundred yards east of Rock Duncan, with a depth of three and a half fathoms of water over it at half tide. It was fished upon.

DUNTZE ROCK.

Nearly a quarter of a mile off Rock Duncan, on the line from Tatoosh Island, Kellett found a rock having three fathoms of water upon it, and to which he gave this name; in heavy weather the swell breaks upon it. There is deep water all around it.

It is one and a quarter miles (N. 35° W.) from Tatoosh Island Light house, and is in the red ray shown from the Light.

With no wind, a heavy swell from the west, ebb current, and proximity to these outlying rocks and the island, a vessel's position is unsafe, and great caution should be exercised in navigating this part of the entrance to the Strait of Fuca.

CAPE FLATTERY.

The extent of ocean shore-line from Cape Disappointment to Cape Flattery is one hundred and forty-eight miles. This cape forms the southern head of the entrance of the Strait of Juan de Fuca. It has a bold, wide, jagged sea face a little more than one mile in length north-northwest and south-southeast, and about one hundred and twenty feet high; the rocky cliffs are much disintegrated by the wearing action of the ocean; the summit rises in one mile to an irregular mountain of fifteen hundred or two thousand feet elevation, and its flanks are cut up by gorges and covered with a dense growth of Oregon pine and almost impenetrable underbrush from the edge of the cliffs to the summit. For seven-eighths of a mile south-southeast of Fuca Pillar there are four outlying rocky masses, ranging from forty one to eighty feet in height, and reaching seven-eighths of a mile from the cliffs. The whole line of cliffs is bordered by low black rocks, as well as some higher masses that are close under the shore.

Fuca Pillar or Pinnacle Rock has already been mentioned as lying close under its southern point. When seen from the southwestward the mountain mass of Cape Flattery is raised as an island on account of the marshy valley of the Wa atch running behind it from the ocean to Waatkaw Bay to Neeah Bay. The best position for seeing this peculiarity is when a vessel is about seven miles south by west from the Tatoosh Island Light house. From this direction the high mountains on Vancouver Island loom up and stretch far away to the northwest and to the east-eastward.

When a vessel is forty miles to the south-southeast the mountain of Cape Flattery is seen somewhat faintly outside the lower and darker outline of Cape Alava. A short distance outside of the cape there is the square Carroll Islet, distant seventeen miles, in latitude 48° 00½′, with a part of Jagged Islet just seaward of it. From this rock stretch eastward the high faintly seen mountains of Vancouver Island.

As the cape is approached Cape Flattery rises; and when a vessel is south-southwest from the mouth of the Quillihute River, the general low-wooded line of the coast stretches with decreasing height nearly round to the north-northwest. Over this low outline are slightly higher and more distant wooded hills. When Cape Flattery bears north by west three-quarters west (N. by W. ¾ W.) at thirty-three miles distance the Flattery Rocks, twenty-one miles distant, are

lifted on the horizon outside the limit of Cape Flattery, which shows as faintly rolling high under which is the comparatively low point of Cape Alava behind the Flattery Rocks. nent on the horizon and just under the summit of the cape is the high square Carroll Islet two lower and smaller rocks just outside. A short distance inside of this is seen Cake long, moderately low with a mound in the middle, and black.

From the northernmost part of the cape the general direction of the shore line running into trait of Fuca is north seventy degrees east (N. 70° E.) for four miles to Neeah Bay, and the southern shore follows the general direction of the Strait of Fuca to the eastward.

The immediate shore-line round to Neeah Bay is of the same forbidding character as the front; it is bordered by jutting rocky points and reefs for three and a half miles and has ne short stretch of beach a quarter of a mile long, backed by high, wooded hillsides. This beach is two and seven-eighths miles inside of Tatoosh Island, faces to the northwest, and behind it is the stockaded village of Clisseet, now used as the summer home of the Muk-kaws.

Under the shores of Cape Flattery and the shore to Neeah Bay, the depth of water ranges ten fathoms at a quarter of a mile outside the shore reef to forty and sixty fathoms at one from shore. There is not much kelp about the cape, because it is torn away by the heavy , but straggling kelp is found near Clisseet village, and in larger mass around Koitlah Point.

The currents are very strong around the cape, reaching as much as three miles per hour along the shore; they set irregularly round the cape, Tatoosh Island, and Rock Duncan. Heavy current rips are seen between the island and the cape and thence toward Neeah Bay.

From the account of the exploration of Don Juan Perez in the frigate *Santiago*, in 1774, we learn that in August he was in the latitude of Cape Flattery and Strait of Fuca, but his log states that in 48° 17' he "saw the land at a great distance" only. The journal of Fray Junipero Serra, who had charge of the missions, etc., shows that the positions of the captain and pilot were much at variance, but whichever was right the foggy and thick weather prevented them seeing much of the land.

In the second exploration of the coast by Heceta, in 1775, neither he, nor Bodega, nor Maurelle report seeing this cape or its relation to the Strait of Fuca. The expedition had met with disaster at Cape Elizabeth and broke up soon after. The last conference was July 29, during the night, in latitude 48°, when the frigate decided to return direct to Monterey, and the schooner "crowded sail to the westward and found themselves masters of their own actions." On their return from the northwest they made the coast again south of 48° far to the westward, and only drew in at Cape Elizabeth to examine the coast thence to 46° 30' north.

The name of the cape is that which Cook gave to this headland in 1778. In 1788 Captain Duncan anchored on the south shore of the Strait of Juan de Fuca, off a village which he calls Claasit, or Chaaset, in 48° 30', and the latter name he gave to the cape. On recent British charts it is called Cape Classet or Flattery, because in 1792 Vancouver stated that as the name given by the Indians to distinguish it, but in a marginal note it is called "Cape Flattery." On De Mofras' map it is called "C. Flattery or I. Tutusy." In 1852 we found that the then head chief of the Muk-kaws, a powerful man about forty or forty-five years of age, called himself and was called by the tribe Clisseet'; but we could not ascertain the meaning of the word or whether this was an hereditary title. On the Western Coast the cape is universally known as Cape Flattery.

From the Hudson Bay Company's chief factors we have learned that it was near this cape that a Japanese junk was wrecked in 1833, accounts of which are found in Beleher's narrative and in that of the United States Exploring Expedition; also in Schoolcraft's Indian Tribes of the United States, p. 217.

The junk had originally a crew of thirteen persons, of whom two men and one boy were alive when she was boarded by the Muk-kaws, off Cape Flattery. The survivors were taken into slavery, but afterwards redeemed by the Hudson Bay Company.

This wreck, with that at Clatsop Point and others found at sea, shows strongly the direction of the prevailing winds, and especially the influence of the great Japan Warm Stream that crosses the Pacific, and reaches the American coast about latitude 55°, where it divides, the greater part flowing down the coast of British Columbia, Washington, Oregon, and California, and the smaller branch sweeping close along the northwest shores, and under Kadiak Island turning to the southwest.

REPORTED BANK OF CAPE FLATTERY.

There has been no exhaustive hydrographic survey of the approaches to the entrance of the Strait of Fuca. The hydrography so far as executed by the British and American Surveys indicate the existence of extensive banks, but no depth of less than thirty-three fathoms is given. The submarine valley of the Strait of Fuca is barred abruptly at the northwest side of the entrance, and seems to run sharply around and outside Tatoosh Island to the south-southwest for a few miles.

Notwithstanding these published results, several navigators have reported less depths of water, and it seems only prudent to briefly refer to them. Fifteen miles by estimation and west-northwest (WNW.) from Cape Flattery, it is reported that a bank exists having eighteen fathoms upon it. The chart gives thirty-eight fathoms in this vicinity. In 1864, a vessel reported having anchored for twenty-two hours during thick weather in twelve fathoms over a bottom of gravel, sand and black specks. Upon the weather clearing up she was west-southwest (WSW.) from Cape Flattery and could just see the top of Tatoosh Island. This would place her fifteen or sixteen miles from the island. In her supposed position the chart gives sixty to ninety fathoms. In July, 1865, the schooner *Brant*, of Victoria, discovered cod-fishing banks off Cape Flattery and caught five barrels of cod after two hours fishing. The fish are known as red cod and weigh from five to fifteen pounds each. The bank has soundings in twenty-five fathoms, and is sixteen miles nearly due west from Cape Flattery. This location has no soundings and lies between fifty and ninety fathoms of water. In 1867 an examination was made by the U. S. Coast Survey brig *Fauntleroy* of halibut banks in fifty fathoms of water off the southwest coast of Vancouver. This is an Indian fishing ground on the tail of the bank stretching twelve miles south from Nitinat Entrance. Then (as in 1852 when we were at Neeah Bay) the canoes go out from Neeah Bay on the ebb current on a certain back range and continue until they have a cross range on Vancouver Island. They catch an average of fifty fish of forty pounds weight each, of indifferent quality, and then return with the flood current and the westerly wind. No extended examination was made by the brig.

About latitude 48° 35′, and seventy-five miles west by south from Tatoosh Island, La Perouse sounded over a bank having thirty-five fathoms and a pebbly bottom. On a line about twenty miles north by east from that point he got forty-two, forty-five, sixty-five, seventy-five, and thirty-four fathoms; thence southeast he increased his depth to ninety fathoms in about seven miles. The weather was foggy, and he had no observations for position. This is, doubtless, the bank lying thirty-five to forty-five miles west from Cape Flattery, and making out from Barclay Sound. The English chart, No. 1917, exhibits this bank, to which I have applied the name La Perouse. The general chart gives a fair representation of the depth of water off the entrance to the Strait of Fuca, and indicates the deep submarine valley parallel with the coast a short distance south of Cape Flattery, but the following figures are instructive:

On a general direction of southwest half west from Tatoosh Island Light-house there are the following depths of water at the given distances: at four miles thirty-four fathoms, at nine miles one hundred and eight fathoms over muddy bottom, at seventeen miles seventy-two fathoms, at twenty-five miles fifty-eight fathoms, at thirty miles seventy-two fathoms over mud, at thirty-seven miles ninety-three fathoms, and at forty-three miles one hundred and seventy-six fathoms over muddy bottom. It is very evident that the marginal plateau of the seaboard extends well out from the coast-line in this latitude.

STRAIT OF JUAN DE FUCA.

The entrance to this strait from the Pacific Ocean lies between Cape Flattery on the Washington side and Cape Bonilla, on Vancouver Island, which forms the northern shore. Its width is about twelve miles, and the bearing from Tatoosh Island to Cape Bonilla is north eighteen degrees west (N. 18° W.). From this line the strait runs east for forty-five miles, with a uniform width of eleven miles. It gradually contracts to eight miles, between Beechey Head on the north and Striped Peak on the south, maintains the same direction and width for five and a half miles farther between Race Rocks and Point Angeles; then changes its direction to northeast by east (NE. by E.) for thirty-two miles to the western shore of Whidbey Island. East of Race Rocks it expands to the northward to a width of eighteen to twenty miles, and divides into two ship channels, the Canal de Haro and Rosario Strait, both leading through Washington Sound

northward to the Gulf of Georgia. It is terminated on the East by Whidbey Island;* at the southeast it passes into Admiralty Inlet and Puget Sound, and is bounded on the south by the mainland of Washington, which forms the entire southern shore of the strait. From the ocean to Whidbey Island the mid-channel distance is eighty-three miles. The depth of water throughout the strait is remarkably great, no bottom being found in its deepest parts with one hundred and fifty fathoms of line, and the ten-fathom line is close under the shores. It is the main artery for the waters of Admiralty Inlet, Puget Sound, Possession Sound, Hood's Canal, Canal de Haro, Rosario Strait, Bellingham Bay, and the vast Gulf of Georgia, extending between Vancouver Island and British Columbia, for one hundred and twenty miles, with an average width of twenty. The currents run with an average velocity of not less than three miles per hour; and off the Race Islands and Beechey Head over six miles an hour. The shores are bold, abrupt, and covered with a heavy growth of varied timber and dense underbrush. On the north side, the mountains rise rapidly from the water, and many attain an elevation of not less than five thousand or six thousand feet. These are covered with fir and spruce nearly to their summits. On the south side for thirty miles from the entrance the shore is bounded by hills from one to two thousand feet in height, backed by the jagged Olympus range of more than eight thousand two hundred feet elevation. For the next fifty miles the shore is generally a steep cliff, from fifty to two hundred feet high, with a flat and densely wooded country extending nearly to the foothills of Olympus, and stretching farther south as we move eastward. When passing through the strait the great Olympus range, when clear and dark, looks as if it overhung the lower line of wooded land forming the south shores. This lower line, at ten miles distance, loses its distinctive features except where such deep breaks as Port Discovery, Squim Bay, e.c., break the continuity, and when there is sufficient haze or smoke inside to give relief to the points at their entrances. There is a great depression in the first part of the range south of Port Angeles. The flanks of Olympus to the north are generally chaparral covered well up to the summits of four or five thousand feet. Inside of these flanking spurs the peaks of very nearly even height are wild, sharp-peaked, and broken, with low angle slopes giving an idea of massiveness. At the eastern limit of the strait the western face of Whidbey Island is very steep; it is about two hundred and fifty feet high, and appears flat, as does the whole country eastward to the dark, sharp-cut outline of the Cascade range, stretching its serrated ridge northward, where the snow peak of Mount Baker† is distinctly seen, and to the southward, where the higher snow peak of Mount Rainier‡ attracts the eye.

During dry summers the Indians and settlers set fire to the forests in every direction, and the country soon becomes enveloped in a vast smoke that lasts for two or three months. At such times it is frequently impossible to make out the shore at half a mile distance. The strong westerly winds coming up the strait disperse it for a while, but only to fan the fires and give them renewed force and activity. Visitors to the high mountains report this smoke as being from six to eight thousand feet deep.

Fogs.—The fogs in the Strait of Fuca are heaviest near the entrance, and decrease in frequency and density up the strait. At the entrance to the strait the fog from the ocean sometimes stands like a wall, and vessels entering the strait run out of it into clear bright weather even before they pass Tatoosh Island. The wind, however, gradually works it in, and it will follow the northern shore past San Juan Harbor to the Sombrio River. Less frequently it reaches nearly to Sooke Inlet, and at times envelopes the Race Islands. As a rule it may be said that the fog is more likely to follow farther into the strait along the southern shore, reaching as far as Port Townsend, when the northern part of this wide part of the strait is free.

In 1852, when we were observing for three months at Neéah Bay, we saw the blackest fog that we have experienced on this coast, and the Indians declared they could not go along the coast in such a case. The foggiest months are July, August, and September. The summer season in this latitude is frequently very rainy, and for the year the rain-fall at the entrance to the strait has reached one hundred and thirty-two inches.

* That part of the Strait of Fuca east of Race Rocks to Whidbey Island, and all of Washington Sound, forms part of the "Gulf of Georgia" on Vancouver's general chart, and on the detailed chart the "Gulph of Georgia."

† Named Montaña del Carmelo by Galiano and Valdez in 1792. Named by Vancouver in 1792.

‡ Named by Vancouver in 1792. Humboldt calls this Mount Regnier, depending upon the narrative of Frémont, who saw it in active operation November 13, 1843. It attains an elevation of fourteen thousand four hundred and forty-four feet, and is flanked by living glaciers first encountered and published in 1857. There are craters at the summit, and hot gases escaping.

Winds and Rain.—In summer the prevailing wind draws into the strait, increasing towards evening, and frequently blowing a ten knot breeze before midnight; but unless the wind is strong outside little is felt in the strait, and frequently sailing vessels may be a week from Cape Flattery to Admiralty Inlet, or *vice versa*. In winter the southeast winds draw directly out and create a very heavy cross-sea off the entrance, the great southwest swell meeting that rolling out. In such cases sailing vessels try to gain Neéah Bay or San Juan Harbor, and remain at anchor until the wind changes. In beating in or out vessels may run as close under either shore as wind and currents warrant, as no hidden dangers have been found half a mile off shore, except at the west side of the small indentation called Crescent Bay, near Striped Peak, forty-four miles inside of Rock Duncan.

In winter the weather off the entrance to the strait is particularly severe and the swell is very heavy and irregular. We have encountered a seven days gale here with a barometer down to twenty-nine inches and heavy downpours of rain. At one time we were in the center of a cyclonic storm. The rainfall at the station of Neéah Bay has reached one hundred and thirty-two inches in a year, the greater part falling in the winter. For four years ending in 1887 the average was ninety-five inches of rain. The months of December, January, February, and March are marked by the greatest averages. Many lumber-laden vessels have foundered off the straits in winter storms. The heavy broken seas are doubtless owing to the shoaling off the entrance, the irregular and very strong currents, and the drawing out of the wind from the strait conflicting with the wind along the outer coast.

Currents.—At the entrance to the strait the currents acquire, during the "large tide" of each day, a velocity of four miles per hour; and after strong northwest winds a very large, short, but regular swell is encountered west of Neéah Bay during the ebb current. If the wind be light and no steerage-way on the vessel, the feeling is decidedly disagreeable, especially as the current seems constantly to set close around Rock Duncan and Tatoosh Island. If a vessel fall into the trough of this swell she is bound to fetch away something.

We know not where to point to such a ramification of inland navigation as exists from Cape Flattery to the head of Puget Sound and through Washington Sound, save in the British possessions to the northward. For depth of water, boldness of approaches, freedom from hidden dangers, and the immeasurable sea of gigantic forest trees coming down to the very shores, these waters are unsurpassed. Washington has a summer and fall climate excelled only by that of California. The shores of Fuca Strait have been gradually settled by immigration coming from Puget Sound and Admiralty Inlet.

There is not a single statement in the so-called narrative of Juan de Fuca as given by Matthew Locke, the elder, that applies to this strait. The whole story is a fabrication.

The Strait of Juan de Fuca was discovered by the long-boat of the *Imperial Eagle*, under the command of Berkely, in 1787.

In June, 1788, it was examined by Meares, in the *Felice*, he having obtained information of its existence from Berkely. At the entrance it "appeared to be twelve or fourteen leagues broad. From the mast head it was observed to stretch to the east by north, and a clear unbounded horizon was seen in that direction as far as the eye could reach." He frequently sounded, "but could procure no bottom with one hundred fathoms of line." He afterwards sent a party to explore the strait, who went up about fifty miles, determining the harbor of San Juan on this trip. He first applied the name "John de Fuca" to the strait. He gives a view of the entrance with Cape Flattery, Tatoosh Island, and Rock Duncan.

After the expedition of 1775, several Spanish expeditions were fitted out for exploration in these latitudes. Haro was in the strait in 1789, Quimper in 1790, Eliza in 1791, and Galiano and Valdez in 1792.

Captain Gray, of the *Columbia*, entered the strait in 1792, penetrated fifty miles in an east southeast direction, and found the passage five leagues wide. He gives the latitude of Tatoosh Island, or Flattery, 48° 24′. The extracts from his log-book, stating particulars of this and the Columbia River exploration, were not made public until 1816. Most of Gray's latitudes, distances, and courses are good and trustworthy.

Vancouver entered the strait in 1792, and gave to the world the first detailed and authentic account of it.

Approaches to the Strait of Fuca from the WSW. (Six views.)

Flattery Rocks,
SE. ¼ S., 18 miles.

Wa-ad-dah Island.

Cape Flattery.

Tatoosh Island Light-house, E. by S. ¼ S., 7½ miles.

Sombrio River.

Vancouver Island. East of San Juan Harbor.

Strait of Fuca.

Seal Rock. West Passage to Neeah Bay. Cape Flattery.
Wa-ad-dah Island, 10½ miles.
North Shore, Cape Flattery, W. by S. ½ S., 14 miles.

Inner Rock. Seal Rock. West entrance to Neeah Bay.
Wa-ad-dah Island, W. ½ S., 8½ miles.

Slip Point, SW. ½ W., 2 miles.

Seal Rock.
Wa-ad-dah Island, W., 17 miles.

THE SOUTHERN SHORE OF THE STRAIT OF JUAN DE FUCA.

NEÉAH BAY.

Koitlah Point, the western boundary of this bay, is three and seven-eighths miles north seventy one degrees east (N. 71° E.) from the Light-house on Tatoosh Island. From Cape Flattery the shore is nearly straight, with short, rocky, jagged points, high and rugged, backed by hills about one thousand five hundred or two thousand feet high, and covered with fir trees to the cliffs. Rocks lie along the shore from one-eighth to one fourth of a mile out, except at Chseet village, one mile west of Koitlah Point. Deep water is found within a third of a mile of the cliffs, and at a distance of half a mile a depth of twenty fathoms is obtained.

The bay is about a mile and a quarter deep to the south-southeast, and the same in width at the entrance. The western side is high, precipitous, and bordered by craggy, outcropping rocks, three hundred or four hundred yards from the shore. The three-fathom line ranges about six hundred yards from the foot of the cliff. The general direction of this side is southeast for one mile, when the hills suddenly cease and a low shore, with sand beach backed by woods, curves gradually to the northeast by east for a mile and a quarter to Ba-ad'-dah Point, formed by a spur of the hills.

The eastern side of the bay is formed by Wa-ad'-dah Island, the northern end of which lies one and a half miles north seventy-four degrees east (N. 74° E.) from Koitlah Point. This island is a narrow, high ridge, about two hundred and fifty yards wide, and half a mile long, covered with trees, and having a direction southeast one-quarter east, pointing toward Ba-ad'-dah Point, and presenting the appearance of a continuation of that spur; but separated from it by a four-fathom channel five hundred yards wide. Off the southwest part rocks extend for two hundred and fifty yards, and the three-fathom line is six hundred yards distant. Along the sand beach of the main shore of the bay the three-fathom line is within two hundred yards of the shore, the depth increasing to seven fathoms, then decreasing to five, in the middle of the bay, and again increasing to ten on the outer line of the bay. Much kelp abounds in this harbor, even in deep water, but it is especially thick around Koitlah Point and thence along the western shore of the bay to the deepest part thereof. It also abounds on the southwest face of Wa-ad dah Island and around into the narrow channel between it and Ba-ad'-dah. Half a mile east of Ba-ad'-dah Point there is another large patch of kelp. This kelp is altogether different from that found in the Santa Barbara channel. It is a long, thin, hollow, flexible stem rising from great depths, and expanding rapidly near the surface of the water to a large hollow bulb, from which float leaves that are five or six inches wide and ten feet long. The lower and thinnest part is used by the Indians for salmon and halibut lines. When coiled away these lines break like grass, but soaking them in salt water renews their elasticity and strength.

Outside of the line joining Koitlah Point and Wa-ad dah Island, the depth of water increases rapidly from ten and eleven fathoms to twenty fathoms in one-third of a mile.

The best anchorage is in the south part of the harbor, in about five or six fathoms of water off the small stream which comes in where the sand beach meets the hills on the west. There was formerly an Indian village at the west side of the stream, but it is now farther to the eastward with straggling Indian houses along the beach to the Indian Reservation on Ba-ad'-dah Point. There is abundance of water at that stream. During southerly weather little swell is felt here, and the wind can do no harm; but when a large westerly swell is coming up the strait, it reaches here, and a vessel rolls uncomfortably unless she rides head to it.

The low ground abreast of the anchorage, and but two or three hundred yards from the beach, is the head of the Wa-atch Slough, a small stream that runs through the low prairie lands behind Cape Flattery, and empties into Muk kaw Bay south of the cape, near the winter village of the Muk-kaws, called Wa-atch. This stream is frequently used by them in winter, when they can not take their canoes outside the cape.

The last time we were in the harbor we anchored in the narrow passage between Wa-ad-dah Island and Ba-ad'-dah Point in five fathoms of water; but it was an uncomfortable berth and the current was quite strong. The white buildings of the Indian Reservation are a marked object in approaching the harbor from the eastward. Small vessels coming from the eastward through this passage with the current running into the bay have not much room to round to for anchorage.

The passage is only four hundred yards wide between the three-fathom curves. The best landing is not good if there is any swell on.

The primary astronomical station of the Coast Survey was just back of the beach, about four hundred yards east of the small stream on the southwestern part of the bay. From the northwest end of Wa-ad-dah Island it bears south by west half west (S. by W. ½ W.), distant one and three-eighths miles.

Its geographical position is:

Latitude	48° 21′ 48″.8 north.
Longitude	124° 37′ 12″.0 west.
Or, in time	8h 1m 28s.

The magnetic variation was 23° 00′ east, January 1, 1885, with a yearly increase of 0° 1′. The maximum of the eastern variation has probably been reached at this time (1888).

NEÉAH BAY—WA-AD DAH ISLAND BUOY.

On the 12th September, 1888, a *second-class Whistling Buoy* was moored in twenty-one fathoms of water, three-eighths of a mile northwest by north half north (NW. by N. ½ N.) from the northwest end of Wa ad-dah Island.

This *buoy is painted red with the letters* **N. B.** *in white*; it is sounded by the action of the sea, and when there is a fair swell on it will give twenty to thirty blasts per minute.

This buoy should be left to the eastward in entering the Bay.

The following bearings and distances to prominent objects give the position of this buoy:

Koit-lah Point	SW. by W.	1¼ miles.
Cape Flattery Light-house (Tatoosh Island)	W. SW.	5¼ miles.

But the Light-house can not be seen from the buoy because a small jutting point called Chi bah' dehl Roc'k, near Chisseet village, hides it.

The Life-saving Station on the south shore of the bay lies almost exactly south one and five-eighths miles from the buoy.

Soon after we left this station the Indians dug up and destroyed all the marks fixed to recover it, under the belief that evil spirits were buried with them.

Tides.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XII.h 25m. The mean rise and fall of tides is five and eight tenths feet; of spring tides, seven and one tenth feet; and of neap tides, four and five tenths feet. The mean duration of the flood is 6h 07m and of the ebb, 6h 18m. The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is 1h 18m for high water, and 1h 02m for low water. The differences when the moon's declination is greatest are 2h 20m and 1h 56m, respectively. The average difference in height of those two tides is one and seven tenths feet for the high waters, and three and one-half feet for the low waters. When the moon's declination is greatest those differences are two and eight-tenths feet and five feet, respectively. The average difference of the higher high and lower low waters of the same day is eight and two-tenths feet, and when the moon's declination is greatest, nine and one-half feet. The higher high water in the twenty four hours occurs about 11h 54m after the moon's upper transit (southing) when the moon's declination is north, and about 32m before, when the declination is south. The lower low water occurs about 7h after the higher high water. The greatest observed difference between two low waters of one day was six feet, and the greatest difference between the higher high and lower low waters of one day was twelve feet.

To find the times and heights of each tide throughout the year, consult the tide tables for the Pacific Coast, published annually by the Coast and Geodetic Survey. In the required tides take out the times and heights at Astoria and subtract seventeen minutes from the given times of the high waters to obtain the time of high water in Neéah Bay in Pacific standard (120th meridian) time and take the height unchanged; for the low waters subtract twenty-three minutes from the given times of low waters, and add four-tenths of a foot to the given heights. But if the tides are wanted in Neéah Bay local time, subtract thirty-five and forty-one minutes from the Astoria times of high and low waters respectively.

This bay was known as Poverty Cove by the early fur traders on the coast; next as Port Nuñez Guona, by Quimper, in 1790. In 1792, the Spaniards, then establishing themselves at Nootka Sound, attempted to found a colony here, and as late as 1847 bricks were found near the

small stream abreast of the anchorage. We searched for vestiges of the settlement in 1852, but found nothing. In 1860 a brick was dug up from the depth of two feet, on the site pointed out by the Indians. Vancouver noted the indentation of the coast here in 1792. It was next called "Scarborough Harbor," by the United States Exploring Expedition in 1841. The Indian name is that now adopted, and the only one by which it is known to navigators on this coast.

Smithsonian Contributions to Knowledge, 220, p. 105, says that Decart or Deeah is the name of the Neeah Bay and village.

In 1852, when we were at Neeah Bay, the Muk-kaws around Cape Flattery could muster three hundred to four hundred warriors, mostly armed with muskets and knives. They had several large stockaded villages and hundreds of canoes; the men were brave and fearless and were quite inimical to the Americans coming in. Although we had entered into a compact with them while making observations for three months, we had within a very short time to build a breastwork before our camp for protection.

The *shore line eastward* from the Wa-ad-dah Island is quite straight to the small cove on the west side of Kydaka Point. The trend of the shore is south eighty-one degrees east (S. 81° E.) and the distance to the cove is ten miles. Ky-da-ka Point stretches out one mile to the north of the cove. The general trend of the shore from the island to Pillar Point is south eighty-nine degrees east (S. 89° E.) to the distance of twenty-two miles.

The general characteristics of the nearly straight line of shore east of Ba-ad'-dah Point are high cliffs, wooded on top, and broken down in places where small short streams have cut through. There are no known dangers outside of the three-fathom line, and the ten-fathom curve is nearly parallel with the shore at a distance of half a mile. Depths of thirty fathoms or more are found at one mile from shore as far as Kydaka Point, where the deep water is close under the point.

Sail Rock.—Two miles east of Wa-ad-dah Island and within the limits of the shore kelp, there is a solitary rock one hundred and fifty feet high. There is a depth of ten fathoms of water close outside of it. Behind it there is a depression in the cliffs that marks the opening of a small stream called the Ok-ho River on the Admiralty charts, but this is not the Indian name, and has probably been confounded with the O' Ko-ho or Hó-ko, thirteen miles eastward of Neeah Bay. The Indian name for the stream is To kwax ose (Tocoesos on the charts). In 1841 the United States Exploring Expedition named the rock Sail Rock from its shape and white appearance. Kellett calls it Klah-o-loh, or Seals (Klah-os-lah on the charts). The Indians sometimes call it Saelock, but this is merely their attempt to pronounce Sail Rock; hence it is occasionally called Seal Rock.

Smithsonian Contributions to Knowledge, 220, says, p. 186: "The name of the rock lying off the mouth of the Tokwaksose (Tocoesos) River, two miles east of Neeah Bay, is Kaith-la-ject."

The Three Hills.—About midway between Wa-ah-dah Island and Kydaka Point, three high wooded hills about a mile apart overlook the shore. They are well made out after entering the strait when the northwest end of Wa-ad-dah Island bears east by south three-quarters south (E. by S. ¾ S.), distant three and one-half miles; they then appear overlapping each other, and the higher part of Wa-ad-dah is nearly in line with them. They are shown on the chart but have no name.

Kydaka Point.—This is the first point inside of Neeah Bay. It is eleven miles south eighty-three degrees east (S. 83° E.) from the northwest end of Wa-ad-dah Island and projects nearly a mile north-northwestward from the trend of the shore lying to the west. There are sunken rocks close under the cliffs, but a depth of twenty fathoms is found within two-thirds of a mile from shore. There is a bight on the western face but it is broad open to the swell coming up the strait. Behind the point the first mountain close to the shore commences the series of high and broken mountains thence eastward.

CLALLAM BAY.

Five miles north eighty-three degrees east (N. 83° E.) from Kydaka Point and fifteen and three-fourths miles south eighty-seven degrees east (S. 87° E.) from the northwest end of Wa-ad-dah Island is Slip Point, the western projection of a very high, rugged, straight ridge running east six and three-fourths miles to Pillar Point. This point rises sharply from the water's edge to a moderate height. The seaward face is scarred by three lines of exposed rock or soil showing yellow among the dark fir forest. These are its characteristic marks.

When Slip Point is seen from northeast by east at a distance of nine or ten miles it shows as a low double-headed point with a lower neck to the eastward rising to a level line hence to Pillow

Point. There is a short reef of rocks extending westwardly a quarter of a mile from the point abreast of the Hygedith village. Close on the outer edge of this danger there is a depth of twenty fathoms on the inside, abreast of the Indian village, there is a depth of eight fathoms.

The western boundary of the bay is Sekou* Point, which lies two miles south seventy degrees west (S. 70° W.) from Slip Point. It is comparatively low and has no dangers under it. Just behind it a noticeable wooded hillock rises to a moderate height, and behind this the heavily wooded hills rise rapidly to a considerable height.

In sailing up or down the strait these different points are seen in a series, just clear of each other, and it requires a local knowledge to determine those which have no special mark.

The width of the bay between Sekou and Slip Point is two miles; its form is nearly semi-circular, so that the depth of the bay to the southward is nearly one mile. There is a broad, low-water beach, through the middle of which empties the Clallam River, a small stream with a rather broad lagoon-form for one mile towards the east behind a low spit. Across the entrance of the bay the depths range to ten fathoms, and in the middle there is a depth of six fathoms; one mile outside the depth is forty fathoms.

The Indian village at the eastern part of the bay near the turn of the Clallam River is named Hygedith on Belcher's chart; that on the west side of the bay is Kla-kla win; on the Coast Survey chart it is named Hoko.

The position of the bay is found by its relation to the high, bold, wooded ridge running parallel to the shore line with an almost vertical water face from Slip Point to the eastward where it ends in Pillar Point. This easily recognized ridge is about one thousand feet high, seven miles long, and falls away rapidly inshore, but with higher mountains three or four miles back. The water along the face of this rocky wall is very deep and the bottom rocky and irregular; there are rocks along the shore-line, but they are close under it; a depth of ten fathoms of water is found at one-quarter mile from the shore, and anchorage is not pleasant.

In the face of this long line of cliff, and two and two-thirds miles from Slip Point, there is the opening to a vein of lignite which has been worked but is not suitable for steam-boat consumption. It is known as the Fuca Strait Coal Mine. The coal is very easily broken, and crumbles by exposure to the weather. In 1857 we saw it fairly tried as fuel upon a steamer, but it did not answer, although an analysis of some of the best specimens is reported to have yielded sixty-eight per cent. of carbon. The mine has been abandoned and the buildings have gone to decay. We anchored off this mine at a distance of a cable's length and found the depth thirty-five fathoms, with a swell upon the rocks in moderate weather sufficient to destroy any boat loading there.

Two miles broad off the face of this line of cliff the depth of the water is one hundred fathoms, over a bottom of mud and black and gray sand, the mud being to the eastward.

The Indian name of Clallam Bay is Kla kla wice.

PILLAR POINT.

This notable point, five hundred or six hundred feet high, projecting into the strait, is seventy-two miles south eighty-eight degrees east (S. 88° E.) from the northwest end of Wa ad-dah Island, and twenty-eight and one-half miles south seventy-eight degrees west (S. 78° W.) from New Dungeness Hook Light-house at Port Angeles.

From Race Island Light-house it bears south fifty-four degrees west (S. 54° W.), distant twenty-three and one-half miles. The high, round topped and wooded hill is slightly separated from the main ridge by a depression; and behind it and on the east side of Pillar Point runs the small stream called Canel River on the Admiralty chart, but the proper name is the Pysht River, and upon it is the Pysht village; Kellett calls this the Ketsoth village.

Pillar Point is wooded from the water to the summit, which is higher than Slip Point. When from the strait, when Slip Point bears southwest one half west nine miles distant, Pillar Point shows darkly against the high mountains of the Olympus range. It is then a little higher than the ridge towards Slip Point, which shows as a low saddle with a neck to the eastward.

When a vessel is three or four miles east-southeast from Wa-ad dah Island, Pillar Point is the outermost point visible along the south shore of the strait.

When the Point is seen bearing southeast one-half south eight or nine miles distant it shows a large, black, haystack rock about one hundred feet high close under the eastern shore of the

* The proper pronunciation of the name Sekou is Sik-ke-u.

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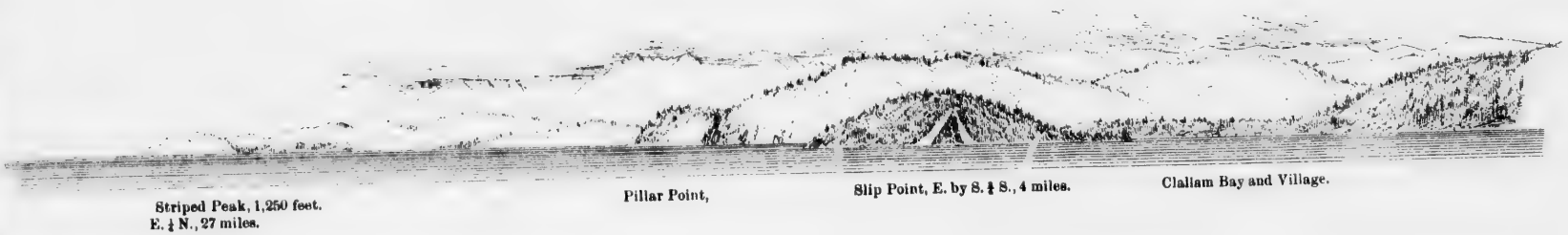
Pillar Point, SE. ¼ S., 8¼ miles.
Olympus in clouds.


Striped Peak, 1,250 feet.
E. ¼ N., 27 miles.
Pillar Point,
Slip Point, E. by S. ¼ S., 4 miles.
Clallam Bay and Village.

Pisht Village.
Pillar Point, W. by S. ¼ S., 7½ miles.
Pillar Point Ridge.
Slip Point.
Towards Cape Flattery.

Point Angeles, 9½ miles.

Striped Peak, 1,250 feet, E. ¼ S., 5 miles. Crescent Bay.

Point Au[illegible] Crescent Bay.

sloping, wooded point. To the westward of the hill the slight break down of the ridge is seen with a bright face. Behind it are the outlying high hills of the Olympus range. On the north face of Pillar Point there is deep water close under the shore; the depth is fifty fathoms at half a mile out.

East of Pillar Point the shore is low and trends south-southeast for one mile, forming a low tongue behind which is the river Pysht. This recession forms an open bay which has less than three fathoms of water through it; but from three fathoms to twenty fathoms the distance is very short. There is an extensive flat of shoal water under the east side of Pillar Point occupying nearly all of the area of the bay; and vessels seeking an anchorage here to await the change of tide in light winds, or when uncertain of their position in smoky weather and waiting for the atmosphere to clear up, must keep the lead going constantly and quickly because the change of depth from ten fathoms to two fathoms is very sudden. There is no kelp here to mark the usual line of five or six fathoms. There are two large rocks nearly southeast from Pillar Point and a vessel should anchor well outside the line between the extremity of the point and the easternmost rock.

The river Pysht under Pillar Point is inconsiderable in size, and does not admit the entrance of a boat except at high water.

A large logging camp is established at Pysht River and the rafts are made up in the river, whence they are towed to the saw-mills in Puget Sound. This settlement is seen to the southward of Pillar Point when the latter bears about southwest, distant six or seven miles.

In sixteen miles east of Pillar Point to Tongue Point, the western part of Striped Peak, the shore recedes in a long curve two miles to the southward, and is a line of moderately low clay cliffs alternating with low shore broken through by many small streams. The shore is bordered close under the cliffs by rocks, and the three-fathom line of soundings average nearly half a mile out. There is a narrow field of kelp along the greater part of this shore-line reaching to six and seven fathoms of water. Outside of this kelp the ten-fathom line averages three-fourths of a mile from shore. On the line between the two points the depth of water is forty-five fathoms abreast of Tree Point, off which a depth of sixteen fathoms is found one mile from the cliff, and three fathoms at nearly half a mile. There is kelp off this point.

Low Point and Lyre River.—This low point is eleven and one-half miles north eighty-two degrees east (N. 82° E.) from Pillar Point. There is no kelp off this point and shoal water makes out some distance. The three-fathom line is half a mile from the shore and sixteen fathoms of water is found at one mile. A small stream called the Lyre River* breaks through this low point.

Wreck Buoy.—The buoy with horizontal black and red stripes, which was formerly placed one and one-fifth miles north by east three-quarters east (N. by E. ¾ E.) from Low Point, has been removed. (October, 1888.)

From Pillar Point to Crescent Bay an anchorage may be had near the coast in ten to six or seven fathoms of water in good weather, and the Coast chart is sufficient to indicate the general conditions, as there are no known dangers outlying the kelp where it exists. There is very often an uncomfortable swell setting along the shore from the westward.

Behind this sixteen-mile stretch of shore the wooded hills rise to the first broken range, and farther in higher wooded hills outlie the Olympus range of mountains. Kellett places one mountain of four thousand feet elevation six miles from Low Point in a south-southeast direction.

STRIPED PEAK.

From Pillar Point the next prominent object is the high wooded hill called Striped Peak, which is one thousand two hundred and sixty-five feet above the sea. The summit, a short distance back from the shore, bears north seventy-seven degrees east (N. 77° E.) seventeen and one-fourth miles from Pillar Point.

The outline of this peak is more regular than any other along the south shore of the strait, appearing like a low, flat cone. When Striped Peak bears east by south at a distance of five miles it shows up very dark in color and regular in form. To the northward and eastward is seen the low Angeles Point, and over it higher and more distant land. To the south are seen the high snow-covered peaks of the Olympus Mountains and a double-peaked intermediate mountain over the bright cliff of Crescent Bay. We have seen it from the west at a distance of thirty

* This is the name on the English Chart of 1847. The Indian name of the stream is Tsa-hoh.

miles when the atmosphere was somewhat hazy behind it, and the peak stood out like a low, flat, cone island. When seen to the east one quarter north at a distance of twenty-seven miles it is the outermost point of land and its seaward slope is a straight line, but from the peak southward the slope is not so perfect. East one-third south, twenty-six miles, the seaward slope was continued a little higher by a fainter, double-peaked mountain beyond; the Striped Peak was dark under the shadow of cloud. A vessel coming out of Victoria sees Striped Peak just to the east of Race Island Light-house bearing south by west from nineteen to fifteen miles, and its outline is nearly as regular as from other directions.

This mountain is in the middle of a straight line of rocky bluff-shore, three miles long east by north and west by south, between Tongue Point at the west and Observatory Point at the east.

There is a line of kelp close under this shore, and the twenty fathom line of soundings is not half a mile from the shore.

Behind Striped Peak the mountains rise rapidly toward the Olympus range. Kellett has located several of these. The nearest one has an elevation of three thousand five hundred feet and lies south-southeast seven miles distant; another peak, six thousand and twelve feet high, is south by east distant eleven and one-fourth miles; a third mountain, of six thousand two hundred and seventy-five feet, bears south thirty degrees east (S. 30° E.) distant thirteen and one-half miles.

Striped Peak was so named from a well-marked line of exposed earth on the water side extending from close under the summit very nearly to the water. The mark is almost obliterated by the growth of vegetation overhanging the side.

CRESCENT BAY.

Tongue Point lies one and one-half miles west by south from Striped Peak, and it forms the eastern side of a slight indentation of the shore line, extending one mile to the westward, where another low point extends out one third of a mile to form Crescent Bay. Tongue Point has several visible rocks stretching out one-fourth or one-third of a mile to the westward. The western point, called Altawas by the Indians, has a *sunken rock* half a mile northward with fifteen feet of water over it and upon which the swell breaks at low water. There is a depth of eight fathoms close outside and six fathoms on the east and west. This is the only known hidden danger on the south shore of the strait inside of Duntze Rock. A *red buoy* has been placed outside this sunken rock in four fathoms of water. Inside the points of the bay there is a depth of six fathoms, and twenty fathoms less than one half of a mile outside.

There is no good anchorage here, as the bottom is not good and the currents between the rock and the reef off Tongue Point are treacherous.

From the buoy to the Ediz Hook Light-house the bearing is north seventy-four degrees east (N. 74° E.) and the distance thirteen miles, just clearing Angeles Point, and from the buoy to New Dungeness Light-house the bearing is north sixty-four degrees east (N. 64° E.) and the distance twenty-four and one-half miles.

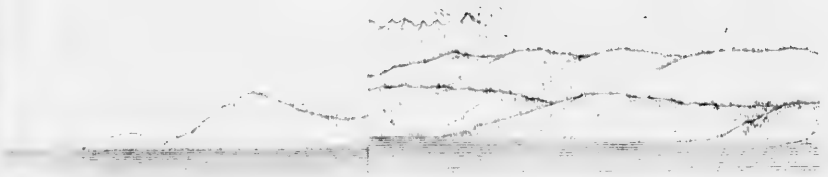
FRESH WATER BAY.

About one and two-thirds miles east of Striped Peak is the moderately low wooded extremity of the land stretching from the peak and forming the western point of Fresh Water Bay. This is known as Observatory Point, and has several visible and sunken rocks running nearly one-third of a mile to the eastward.

The eastern point of the bay is the low delta named Angeles Point, under the western side of which empties the Elwha River by several mouths.

Angeles Point bears north sixty degrees east (N. 60° E.) three miles from Observatory Point, and from the line joining these the southern shore recedes a little over a mile with an irregular outline. On the line of the two points the depth of water is about fifteen fathoms; inside of this the depth decreases to six fathoms at about half a mile from the shore, which is clean except towards the western part where there is a narrow line of kelp for one and one-fourth miles to Observatory Point. Off the delta the depth decreases from one fathom to ten fathoms in a mile; and to the eastward of Angeles Point a great bank having from five to ten fathoms of water upon it stretches northward a mile and eastward towards Ediz Hook.

The spit off Point Angeles must be approached with great care in thick weather, because



Striped Peak, 1,25

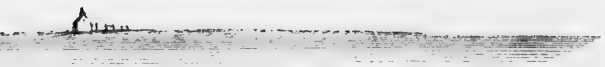
Striped

Striped Peak, 1,250 feet, E. ¼ N., 14 miles. Crescent Bay.

Ediz Hook Light-house (approx. SW. by W., 6 m

Striped Peak, 1,250 feet, E. ¼ S., 26 miles.

Olympic Mountains.



ht-house (approx. SW. by W., 6 miles). Weather smoky.

there are no trees on the extreme point, and therefore it can not be seen until one is close upon it; although if the lead is used vigilantly it will give fair warning of its proximity.

Fresh Water Bay is an open roadstead, but anchorage may be had in moderate weather. But it affords no shelter from the westerly swell except close under the lee of the rocks off Observatory Point, where a vessel may find comparatively smooth anchorage with good holding ground close up to the kelp. In the eastern part of the bay the bottom is smooth rock, on which the anchor will not hold.

The Elwha River is reported to be one of the most convenient places for obtaining fresh water; it is a very rapid mountain stream and brings down a large amount of material in suspension. The western tributary of the Elwha rises in Lake Sutherland.

The name of the bay is that given on the Admiralty chart of 1847.

There is an Indian village on the Elwha of the same name.

THE ELWHA BANK.

Northeastward of the low delta of Angeles Point an extensive ten-fathom bank reaches more than half way to Ediz Hook. The western limit of the ten-fathom curve stretches northnortheast about one and one-half miles and then runs nearly east-northeast for three miles, when it drops off suddenly into fifty fathoms. Outside these limits to the west and northwest the twenty-fathom line reaches two-thirds of a mile. Inside of the ten-fathom line the depth is moderately regular in to the three-fathom line, which is one-half of a mile from the shore. But under the eastern point, and thence inshore to the western part of the Ediz Hook, the deep pocket of forty fathoms cuts under to the westward. There is frequently a very heavy swell on this bank, and there is no protection from it. The bottom is gravel and broken shells and fine gray sand inshore. In the pocket the bottom is fine sand and mud.

PORT ANGELES.

Eleven miles north seventy-one degrees east (N. 71° E.) from Striped Peak and six and one-half miles north seventy-three degrees east (N. 73° E.) from Angeles Point, is the Light-house upon the eastern extremity of the Ediz* Hook.

This Hook is a long, low, very narrow sand spit stretching out from the clay bluff three miles north fifty-six degrees east (N. 56° E.), with a regular sweeping curve swelling a little to the northwest. The extremity lies one and one-half miles off the main shore, and thus an excellent and extensive harbor is formed, protected from the north round by the west and south, but open to the eastward, with deep water of twenty-five to thirty fathoms over a sandy bottom close under the inside of the sand spit almost to the head of the bay. Through the center of the bay we found a line of fifteen fathoms over sticky bottom, and between that and the main shore it shoals very regularly, with the same kind of bottom. The three-fathom line lies as much as a quarter of a mile from the south shore, and there is a broad, low-water beach; but in places the clay bluff, which is about seventy-five feet high, comes almost directly to the high water line except in a few localities. The bluff and the flat country back of it are densely wooded.

Fresh water is found at several places on the south shore, but the extensive flats render it difficult to obtain.

Under the south shore is the site of the town of Port Angeles, stretching for a mile and a half east and west, but at present principally represented by a small settlement abreast Taylor's (or Norman's) Creek, from which extends a wharf seven hundred feet into the bay, with a T one hundred feet long. There is a depth of sixteen and one-half feet of water at the end of the wharf, which lies one and two-thirds miles south twenty-nine degrees west (S. 29° W.) from the Ediz Hook Light-house. On the outside of the spit very deep water is found close to it, and the Hook may be rounded within a cable's length in twenty-five fathoms. Half-way from the Light-house to Angeles Point is the eastern edge of the Elwha Bank, with ten fathoms of water; it has been already described.

In foggy and smoky weather, with no wind and the currents unknown, a vessel on this side of the strait must be vigilant and keep the lead going.

Vessels coming up the strait and bound for Departure Bay sometimes go into Port Angeles and telegraph to Port Townsend for a tug.

* So named on the Admiralty chart, 1847; E-ediz on that of 1859.

The Hook is covered with coarse grass, and in many places with driftwood, showing that the sea sometimes washes over it. Although it lies well out of the line of vessels bound either in or out of the strait, it has been deemed necessary to mark it with a Light-house. In thick, hazy weather it would probably be distinguished if clumps of trees were planted upon it, as we recommended in 1852 for the low tongue of New Dungeness. From the middle of the strait the Hook can not be seen, and its position is ascertained by the Light-house buildings or the peculiarities of the bluff beyond.

At the head of the bay, and connected therewith by a small outlet, there is a large salt water lagoon. The beach at the head of the bay affords a capital beach for heaving down a vessel.

In 1852 we occupied an astronomical station at the head of the bay; it was two and five eighths miles southwest by south from Ediz Hook Light.

THE LIGHT HOUSE ON EDIZ HOOK, PORT ANGELES.

The Light-house is within fifty-five yards of the eastern extremity of the Hook forming the northern side of the bay of Port Angeles and sixty-seven yards from the inner beach. The structure consists of the keeper's dwelling of one and a half stories, painted white, from which rises, just above the roof at the outer end, the short square tower, also painted white, with the dome of the lantern black. The height of the focal plane is thirty-five feet above the base and forty-two feet above the sea. The light is a *fixed white light* of the fifth order of Fresnel, illuminating the entire horizon. It was first exhibited April 2, 1865, and is shown from sunset to sunrise. In ordinary states of the atmosphere it should be seen from a height of—

10 feet at a distance of 11.0 miles.
20 feet at a distance of 12.5 miles.
30 feet at a distance of 13.7 miles.

Its geographical position, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	48° 08′ 24″ north.
Longitude	123° 24′ 07″ west.
Or, in time	8h 13m 36s.5.

The Light-house is visible in day-time from a ship's deck when abreast of Race Rock Light-house.

The magnetic variation for January, 1885, was 22° 40′ east, and it was then at the period of maximum variation.

FOG SIGNAL AT EDIZ HOOK LIGHT-HOUSE.

On December 1, 1885, a fog bell weighing three thousand one hundred pounds was established at this station. The bell-tower structure is the frustum of a square pyramid thirty feet high and fifteen feet square at the base, and painted white. It is situated one hundred and eight yards northwest by north from the Light-house. The *bell* is struck by machinery, and during thick and foggy weather is sounded a *single blow at* intervals of fifteen seconds.

A fog signal is very necessary at this point.

From this light we have the following bearings and distances to important points:

Pillar Point	S. 75° W.	28¾ miles.
Northwest point of Waaddah Island	S. 82° W.	50 miles.
Red Buoy off Crescent Bay Rock	S. 74° W.	13 miles.
Race Island Light-house	N. 54° W.	10¼ miles.
Esquimalt Light-house	N. 31° W.	17¼ miles.
Victoria Light-house	N. 24° W.	17 miles.
Port Discovery Light-house	N. 3° W.	18½ miles.
Smith's Island Light-house	N. 39° E.	24½ miles.
New Dungeness Light-house	N. 53° E.	12 miles.
Buoy off Dungeness Light-house	N. 51° E.	12½ miles.

Tides.—These were observed in 1884 during the progress of the hydrography, and while they follow the general law for the Pacific Coast they proved to be very irregular and perplexing. It often happened that there was no perceptible movement of the tide for five or six hours and less a few inches throughout the day. The mean rise and fall of the tides is four and seven-tenths feet.

The Corrected Establishment or mean interval between the time of the Moon's transit and the time of high water is XIVh 16m, but they may occur 2h 30m earlier or later.

The time and height of the tide at Port Angeles are given for every day in the year in the "Tide Tables for the Pacific Coast of the United States," published annually by the U. S. Coast and Geodetic Survey.

The bay was first discovered by Galiano and Valdez, and by them made known to Vancouver in 1792, who named it the Puerto de los Angelos on his chart. We first heard of the name False Dungeness in 1852, when at Cape Flattery, from traders who did not know the proper name of the harbor. The United States custom-house for this district was removed from Port Townsend in 1862 and located on the south side of this harbor in the mouth of the sharp gully, nearly two miles south-southwest from the point of Ediz Hook. On the 16th of December, 1863, the village and custom-house were destroyed by a torrent of water bursting through the gully behind the town, an accumulation of fallen timber that had dammed up the waters having suddenly given way. The custom-house was again removed to Port Townsend, but there is now an inspector of customs here. The town-site is located along the southern shore, including the bluff, for a little more than one and a half miles.

There is said to be a population of fifteen hundred people at this place.

The largest Indian village of the Clallams* was nearly one and a half miles south by east half east from the Light-house. There were three of the Clallam villages in 1852.

NEW DUNGENESS BAY.

The shore from the head of Port Angeles runs in a slightly curving line for nine miles to the east-northeast, and at seven miles from Ediz Hook it runs nearly straight for six miles, to the New Dungeness Light-house.

The slightly projecting point in the deepest part of this bight and four and four-fifths miles east by south (E. by S.) from Ediz Hook Light-house is Green Point. It has five fathoms of water at one-quarter of a mile outside. To the east of it there is no kelp; to the westward for four miles there is a field of kelp reaching out to seven fathoms of water.

Four and one-fourth miles northeast from Green Point another long, low, narrow sand spit, covered with coarse grass and very similar to Ediz Hook, leaves the high, clay bluff shore and stretches in a general north-northeast direction for three and seven-eighths miles. This spit forms the northwestern shore of the roadstead of New Dungeness.

The southeast shore is distant two miles south by east from the Light-house and runs six miles to the east-southeast, to Washington Harbor. This leaves the bay broad open to the east-northeast.

The depth of water along the outside of the spit is very great; at one-third of a mile this depth is ten fathoms over hard sand and gravel bottom; and it drops off very suddenly to thirty fathoms within half a mile. Along the outer southern part of the spit toward the bluff the ten-fathom curve stretches out one and one-half miles, and the twenty-fathom curve runs on nearly a straight line to within two miles of Ediz Hook.

Off the northeastern extremity of the spit a long gravel reef extends over three-fourths of a mile from the light to the north-northeast, dropping off suddenly from five and ten fathoms to fifty fathoms of water with heavy rips at the change of the tides and currents, as the three-fathom curve extends out three-fifths of a mile from the light. This danger is marked by a buoy, as hereafter described.

The depth of the bay to the westward is much inferior to that at Port Angeles, because on the inside of the main spit at one and one-eighth miles from the extremity a second spit makes directly south for one and one-fourth miles and reaches to within one-quarter of a mile of the southern bluff. This second spit divides the bay into the outer or eastern harbor proper and the inner shoal-water bay or estero, which is two and one-third miles long north-northeast and south-southwest by seven-eighths of a mile wide. It is occupied by marsh and extensive flats. Through the narrow channel connecting the two the water passes as over a rapid at low tide.

Abreast of this point is a narrow passage, which is the opening of the Dungeness River, under a bluff sixty feet high, upon which was a large village of the Clallams. An abundance of fresh water is to be had at this stream, but boats must obtain their supply at low tide and come

*The tribes now generally known, but erroneously, by this name, call themselves the Nus-klai-yam; they occupy the American side of the strait from the Okeho, or Hoko, under Sekou Point, at the west side of Clallam Bay, and the seven miles from Neeah Bay. Their congeners are the T'sok and Sugh-us on part of the Vancouver side of the strait.

out when the tide has risen sufficiently. The eastern shore of the Dungeness River is low, swampy, and covered with trees and brush. It forms the main or southern shore of the roadstead, and off it lie the extensive mud flats, which are bare at low water for five-eighths of a mile to the northward, and continue as far to the east southeast as Washington Harbor. The area of the outer harbor is restricted by the flats one-third of a mile in width lying under the east side of the secondary spit, and by the extensive mud flats on the southern shore, where the three-fathom line is one-half of a mile from the low shore.

Beyond these flats the depth of the water throughout the harbor ranges to ten fathoms, with soft, tenacious, muddy bottom. The deepest water is under the extremity of the spit, where a depth of twenty fathoms is found one-third of a mile from the Light-house; but the best anchorage is close under the spit in ten fathoms of water one-third of a mile from the beach to the westward, with the Light-house bearing north by east one-half east, distant one-half of a mile. A steamer may anchor closer in to the northwest of this location, with the Light-house bearing northwest by north, distant three-fourths of a mile; anchorage is had in ten fathoms over soft, sticky bottom; the nearest shore to the southward is one and one-fourth miles, and the nearest mud flat in that direction is distant three-fourths of a mile.

A southeast wind drawing out of the strait blows directly into this harbor, but the bottom will hold any vessel with good ground tackle. The only difficulty is to get the anchors out of the mud after riding out a gale for two or three days. In the last position mentioned for anchorage a vessel can readily get under way when the southeast wind comes up, and clear the point and the danger off it.

This point is so low that vessels bound in or out of the harbor, before the erection of the Light-house, were upon it before they were aware of their danger. Several had run ashore on the outside beach; and in 1855, while we were anchored close under the point, with the weather thick and hazy, a vessel from Admiralty Inlet had been set out of her course by the currents, and came driving in with studding sails set, and only saw her mistake and danger when the black hull of our vessel attracted her attention.

In December, 1871, the spit was cut through by the sea during a heavy northwest gale, which made a breach fifty yards in width.

THE LIGHT-HOUSE AT NEW DUNGENESS.

The structure is about one sixth of a mile from the eastern end of the point,* and consists of a keeper's dwelling of stone of a grayish yellow color, with a tower of brick eighty-nine feet high and rising about sixty-five feet therefrom. It is the frustum of a cone, of which the upper half is painted black and the lower half white. But when seen from the northward at some distance the dark gray dwelling makes the tower appear to have a lower dark band. The tower is surmounted by an iron lantern, painted red; the height of the focal plane is one hundred feet above the level of the sea.

The light was first exhibited December 14, 1857, and shows every night, from sunset to sunrise, a *fixed white light* of the third order of Fresnel, illuminating the entire horizon. It should be seen from a height of—

10 feet at a distance of 15.1 miles.
20 feet at a distance of 16.6 miles.
30 feet at a distance of 17.7 miles.

Its geographical position, as determined by the Coast and Geodetic Survey, is:

Latitude	48°	10′	55″ north
Longitude	123°	06′	31″ west
Or, in time	8h	12m	26s.1

The magnetic variation for January, 1885, was 22° 40′ east; there was no yearly variation, the maximum variation had been reached.

* On the 2d of December, 1871, there was a violent gale of wind from the northwest, during which a breach across the spit nearly fifty yards in width, cutting off communication along the spit from the Light-house, except at low water and with a smooth sea. This cut was temporary. The sea also hundred feet into the spit northeast of the Light-house and reduced the distance of the Light-house by that amount. At times during this gale clouds of sand arose and completely enveloped the top of the

From the Light-house we have the following bearings and distances to important points:

Ediz Hook Light-house	S. 53° W.	12 miles.
Crescent Bay Red Buoy, off the Rock	S. 64° W.	24½ miles.
Pillar Point	S. 68 W.	40 miles.
N. W. Point of Waaddah Island	S. 77° W.	61 miles.
Race Island Light-house	S. 87 W.	18½ miles.
Esquimalt Light-house	N. 67° W.	20 miles.
Victoria Light-house	N. 63° W.	18½ miles.
Discovery Island Light-house	N. 43 W.	15½ miles.
Smith's Island Light-house	N. 27° E.	13⅜ miles.
Red Buoy off Point Partridge	N. 54° E.	13 miles.
Admiralty Head Light-house	N. 70° E.	17½ miles.
Point Wilson Light-house	N. 74° E.	14¾ miles.
Black Buoy on Partridge Bank	N. 41° E.	12 miles.

During the surveys of this part of the strait the Light-house at New Dungeness frequently exhibited the extraordinary effects of unusual refraction during the periods of calm and warm weather which prevail in the summer and part of the fall. At times the Light house tower would be raised up five times its usual height and then suddenly change to a low black line close to the ground.

STEAM FOG-SIGNAL AT NEW DUNGENESS.

About one hundred and fifty yards to the northeastward of the Light-house, and very near the extreme northeastern point is the small building containing the steam fog-whistle. The sounding apparatus is a twelve-inch *steam whistle*, which is *sounded every minute during* thick, foggy, and smoky weather, with the following characteristics: *blast six seconds, interval twelve seconds, blast three seconds, interval thirty-nine seconds.*

The surveying brig *Fauntleroy* reports that when at anchor in Port Townsend the fog-whistle of New Dungeness has frequently been heard. This fog-signal was established February 1, 1874.

The bearings and distances to important points may be taken as the same as those for the Light-house.

Formerly the fog-signal was given by the striking of a great bell.

BUOY OFF THE POINT OF NEW DUNGENESS.

A *first-class nun-buoy painted red and numbered* 2 has been placed in twenty-seven feet of water in hard, sandy bottom to mark the end of the long gravel reef which extends fully three-fourths of a mile from the Light-house toward the north-northeast.

The reef outside of it drops off rapidly, but to the west-northwest and east-southeast it drops off very suddenly to twenty and thirteen fathoms of water. Half-way between this buoy and the Light-house the reef has a spot with only sixteen feet of water upon it.

The buoy must be left to starboard by vessels entering the New Dungeness roadstead or bound up the strait.

From this buoy the—

Light-house on the Point bears	S. by W. ¾ W.	¾ mile.
Point Wilson Light-house	N. 76° E.	14 miles.
Ediz Hook Light-house	S. 51° W.	12¼ miles.

In the earlier placing of the buoy it has slipped off the edge of the reef into deep water; its position is carefully watched and changed when any change is found in the reef, which is supposed to be making out.

Tides.—The approximate Corrected Establishment, or mean interval between the Moon's transit and the time of high water, is XV^{h}. 07^{m}. and the mean rise and fall of the tide four and two-tenths feet.

To obtain the Pacific standard time and height of any tide in the year take the time and height for the required date at Port Townsend from the Coast Survey Tide Table of the Pacific Coast and subtract one hour and ten minutes from the tabular time of high water and subtract one and five-tenths feet from the height; for the time of low water subtract one hour and six minutes from the tabular time of low water and for the height subtract four-tenths of a foot. To obtain

the local times of high and low water, subtract from the Port Townsend times one hour and twenty-two minutes and one hour and eighteen minutes respectively.

This harbor was discovered by Quimper in 1790 and named el Pureto de Quimper. He placed it in latitude 48° 11′. The long protecting sand spit was called Point Santa Cruz, under which he anchored. He says they found a sheltered harbor under the point, but it had very little water in it, and little water in the entrance to it, so that it was suitable for small vessels only. He took possession of the country July 4, 1790. It was first examined and made known by Vancouver. The present name was given to it by him in 1792.

There are numerous settlers about the bay and in the country behind it, where there are large openings of prairie; and the village of New Dungeness lies behind the bluff at the southwestern end of the inner harbor, an estero. Into this harbor the small craft trading along the strait and sound enter and carry away produce from the settlement.

Eastward of New Dungeness to the entrance of Admiralty Inlet, fourteen miles, there is a deep recession of the general shore-line for five miles to the southeastward, with openings to Washington Harbor and Port Discovery. In this recession there is a large island off the mouth of Port Discovery. On the line between Point of New Dungeness and Point Wilson there is the northern limit of the Dallas Bank, which stretches north-northeast from Protection Island.

WASHINGTON HARBOR.

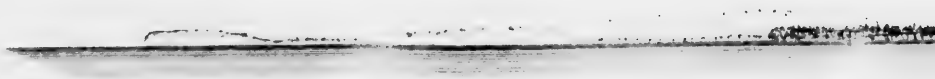
From New Dungeness roadstead to the entrance of this harbor the immediate shore-line is nearly straight for five and one-half miles on a general course southeast by east one half east (SE. by E. ½ E.) with a slightly projecting angle midway, called Kulo Kala Point. The shore is low and flat, covered with trees, and bordered by an extensive mud flat averaging nearly one mile wide; but behind it at a very short distance there arises an apparently level plateau heavily wooded and densely filled with underbrush. The entrance to the harbor is nearly closed by a low sand spit stretching across from the east almost to the western side, where a narrow channel-way of perhaps two hundred yards breadth exists, having a depth of two fathoms through it. This spit is covered sparsely by stretches of coarse grass and can not be seen from New Dungeness Point on account of the outward curving of the intermediate shore, but the bluff is seen at the northeast part of the harbor, whence the sand spit starts. Abreast the west end of the sand spit the opposite shore is formed by the point of a bluff, to the northwestward of which is a low sandy point, from which stretches out a shoal which masks the channel in approaching the entrance. The points of bluff at the mouth of the harbor are a mile apart; the general direction of the spit between them is southwest and northeast. The bluff at the northeast is named Pitship on the latest chart. That at the southwest is named S'quim.

Inside the harbor the general depth of the water is ten to twenty fathoms, over a muddy bottom, and six fathoms of water can be carried nearly to the head. The breadth of the harbor is little over one mile, and its general direction southeast for three and a half miles. The shores of the harbor rise rapidly, and are heavily covered with the Oregon pine. At the head of the harbor the wooded mountains rise to two thousand one hundred and two thousand six hundred feet within two or three miles.

To enter this harbor a vessel must approach Pitship bluff and then keep close under the west side of the entrance spit and round it closely, because a shoal makes from the west end of the spit across the narrow entrance and overlaps it. In the approaches outside of this shoal a depth of ten fathoms of water is found about three-fourths of a mile from either shore, increasing to twenty fathoms over a stiff muddy bottom at one mile. Inside the entrance a long shoal runs out to the southeast from the end of the spit, thus confining the channel under the west shore.

(For National Quarantine Regulations affecting this port, see notice under San Francisco, page 247.)

This harbor was not seen by Vancouver, and was not mentioned to him by the Spanish navigators Galiano and Valdez, although they gave him the position of Port Angeles, which they had not seen. It was first sounded by the United States Exploring Expedition in 1841. It is also Budd Inlet, but as the head of Puget Sound has the same name we have adopted Kellett's appellation of Washington Harbor. The Indian name of the harbor is S'quim, by which it was generally known to the settlers after 1850. The old edition of the chart calls the long spit Kulo Kala Point. On the last edition the west point is named S'quim.



Point Wilson Light-house, E. by S., 18 miles

Protection Island,
SE. by E. ¼ E., 13¼ mile

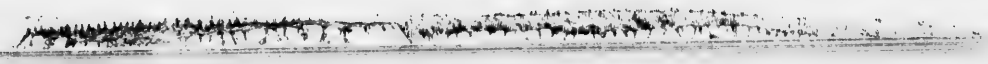
Cape George. Port Discovery. Protection Island, SE. by S.

Admiralty Head Light-house.

Protection Island, SE. by E. ¼ E., 13¼ miles.

Port Discovery. Clallam Point.

Mount Chatham, 2,110 feet



Protection Island, SE. by S., 6 miles.

Mount Chatham, 2,110 feet.

ight-house.

Point Wilson Light-house, E. by S., 13 miles

Point Wilson Light-house, E. by S., 18 mi

Mount Chatham, 2,110 feet

at.

miles

PROTECTION ISLAND.

This island is one and two-thirds of a mile long and about two-thirds of a mile wide across the middle. Its general direction is northeast and southwest, and it lies one and two-thirds miles squarely off the entrance to Port Discovery. There is a long, low point at each end of the island; that at the west is rocky and sandy, that at the east all sand. The highest part is near the western extremity, and reaches an elevation of two hundred and fifteen feet, but the fir trees which cover this end of the island make it look much higher. The sides are very steep, and rise from ninety to one hundred and thirty feet high. The seaward crest of the eastern part is covered with a narrow fringe of stunted pines; the eastern slope is steep and grassy, and that towards Port Discovery is undulating and covered with fern. The principal part of the eastern half of the island is cultivated.

Midway up the face of the cliff toward the northwest and near the angle of the northern shore there is a horizontal streak of gray glacial clay almost three feet broad, which is a local feature easily recognized.

The southwest extremity of the island lies seven and one-half miles west one-half south (W. ½ S.) from the New Dungeness Light-house, and the northernmost part of the island is seven miles south fifty-eight degrees west (S. 58° W.) from Point Wilson Light-house.

The southwest point of the island is two miles north seventy-five degrees west (N. 75° W.) from Challam Point at the west side of the entrance to Port Discovery, and the northeast point is one and three-fifths miles north sixty degrees west (N. 60° W.) from Point George at the east side of the entrance.

On the inside of Protection Island there is a good broad passage round either end. In the eastern passage the width of the channel between the five-fathom lines is one and one-fourth miles, with good water close under Cape George and very deep water off the point of Protection Island. There is a depth of fifty-three fathoms in the channel. The width of the western passage between the black buoy off the west point of Protection Island and the nearest bluff to the south-southwest one mile and a quarter west of Challam Point, is one and one-eighth miles. The greatest depth of the channel is sixty five fathoms.

Vessels bound into Port Discovery from the strait with a southerly wind enter by the western passage, because the southerly wind draws out of Washington Sound and gives a fair working breeze to reach Point Challam.

On the inside shore of the island there is moderately deep water close under the banks, and anchorage may be had in ten fathoms about three hundred yards off the shore. There is no kelp off this shore except in the middle of summer, when there is a little near the buoy. North-northwest of the island an extensive shoal makes out to the north-northwest, known as the *Dallas Bank.** Directly off the shore the three-fathom line extends fully half a mile out, and the outer line of the kelp marks the four-fathom line. The limit of the ten-fathom line of this bank is two and one-half miles to the north-northwest or one-half mile outside the line between New Dungeness Light-house and Point Wilson Light-house; the breadth is about one and a half miles. This ten fathom line runs sharply to the east point, but it swings three-fourths of a mile off the west point and half a mile out to the southwest by west and beyond the black buoy. This bank affords anchorage when a vessel is baffled with light airs and strong adverse currents. The bottom is irregular, full of huge bowlders toward the island, and sand and gravel toward the strait. The bottom falls off suddenly on the east side of the bank to thirty and forty fathoms; and on the west side to twenty and thirty fathoms.

The latest chart does not give a shoal spot of three and four fathoms near the outer limit of the bank, laid down by Kellett. It is almost exactly on the line between New Dungeness Light-house and Point Wilson Light-house, and six and two-thirds miles from the former and seven and two thirds miles from the latter. This places it on the northwest edge of the bank, so that there may be some slight error in the position. The Survey brig *Fauntleroy* frequently passed over this locality in search of this shoal spot.

BUOY OFF PROTECTION ISLAND.

A *first-class can-buoy painted black and numbered* 1 has been placed in five and a half fathoms of water about half a mile from the end of the sand and rocky spit which makes out one-third

* Named by the Coast Survey in 1862.

of a mile from the southwest point of Protection Island. When vessels are entering Port Discovery by the western passage under the south side of Protection Island they leave the buoy on the port hand. There is very deep water close under it toward the southern shore, but a three fathom tail of the Dallas Bank reaches half a mile west-southwest from the buoy.

At the buoy the following bearings and distances are given to important objects:

New Dungeness Light-house	W. ¼ N.	7¼ miles
Southwest end of Protection Island	E. by N. ¼ N.	½ mile
Challam Point	E. by S. ¼ S.	2 miles

This island, with Point Angeles and New Dungeness, afford the first examples of the peculiar low, sandy, and gravelly points covered with coarse grass and bushes making out from the high cliffs into very deep water, where the tendency of strong currents would seem to be to cut them away.

It was named Protection Island by Vancouver in 1792, and on account of its position in relation to Port Discovery it is very aptly named.

PORT DISCOVERY.

This land-locked bay lies in the eastern part of the bight between New Dungeness and Point Wilson. The western point is just five miles nearly northeast from the entrance to Washington Harbor. It is not readily made out by a vessel in the strait, because the entrance appears blockaded by Protection Island and the wooded shores of the bay overlap.

From New Dungeness Light-house the western head of the entrance to the port named Challam Point* is nine and one-half miles distant, and bears south eighty-two degrees east (S. 82° E. From the New Dungeness buoy it is nine miles south seventy-seven degrees east (S. 77° E.), and that line passes just south of the black buoy off the southwest point of Protection Island.

The intermediate four and one-quarter miles of shore between Washington Harbor and Port Discovery is slightly curved towards the northwest and is formed of high, broken cliffs. The highest cliff is about one and one-fourth miles southwest from Challam Point and is probably two hundred feet above the sea. The surface above the cliffs is densely covered with the Oregon pine and a thick undergrowth. The five fathom line is quite close under the cliffs, and the ten fathom line does not average one-fourth of a mile from them. There is no kelp along this shore.

The western or Challam Point is low, but rises quickly to a moderate height and slopes to the southward. The eastern point of the entrance to Port Discovery is Cape George, and it is one and one-half miles northeast one-fourth north from Challam Point. It is a steep cliff that rises directly from the water, which is very deep under the south side; under the north side the three fathom curve is not over two hundred yards from the shore. The average width of the bay is nearly one and three-quarters miles for nine miles of its length, and then decreases rapidly to the Sequim River. It makes four general courses from the entrance to the head, as follows: One and three-quarters miles south, four miles east by south two-thirds south, two and a half miles east by east, and one and three-quarters miles southwest by south. The shores are abrupt, and covered with wood to their edges, and the projecting parts are all terminated by low points stretching out short distances with deep water off them. On the second point, on the eastern side, were, in 1856, the remains of an extensive stockaded village of the Challams. When a vessel enters the bay Mount Chatham† rises up towards the south and overlooks all these waters; it is only two and two-thirds miles from the nearest shore and reaches two thousand one hundred and ten feet elevation. It lies west-southwest from Point Discovery.

When well in this bay Protection Island so completely shuts up the entrance as to make it appear as a large lake. The great drawback to this port is the depth of water, where the channel is not less than twenty-five fathoms in any place, and in some places it is forty fathoms. Under the second low point on the east we could not find less than twenty-five fathoms of water a few ship lengths from the beach, but found good anchorage in twenty fathoms, soft bottom, on the western shore two miles south-southeast from Challam Point and abreast of a low swampy beach.

In the deepest part of the bight between Challam Point and this anchorage, off the mouth of Eagle Creek, there is good anchorage in ten fathoms of water about four hundred yards off the shore.

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*Challam on the charts. †Named by the Coast Survey in 1855.

At the head of the bay it contracts in width, the water shoals, a large mud flat exists for the last mile, and the shores become higher; but in places the hills retreat, and give a scanty space for a few settlers' cabins. For a few years after the settling of San Francisco many vessels came here for piles and spars; but a large saw-mill has been built upon Point Discovery, which is the third point inside on the western shore where the bay is scant one mile wide and the depth of water in mid-channel is twenty-two fathoms. This was a low point projecting slightly from the general line of bluff. There is good anchorage in the bay near the saw-mill.

The Port Discovery mills reported for 1884 their output as 25,000,000 feet of lumber, 12,000 piles, and 8,000,000 laths, of a total value of $316,000.

They have a capacity of 100,000 to 120,000 feet of lumber a day.

When a vessel is in the strait with Port Discovery partly open just to the east of Protection Island, the steam from this saw-mill is seen rising as a high, white column in marked contrast with the dark fir foliage on either hand. Directly west southwest from the saw-mill is the high wooded mass of Mount Chatham, already mentioned.

Tides.—The Corrected Establishment, or mean interval between the time of the Moon's transit and the high water, is XV^{h}. 44^{m}. To find the times and heights of each and every tide throughout the year consult the Tide Table for the Pacific Coast published annually. For the Pacific standard time and height of any required high water take out the time and height for the same tide at Port Townsend, and from the given time subtract thirty-four minutes and from the given height subtract eight-tenths of a foot. For low water take out the time and height of the required tide for Port Townsend and from the given time subtract twenty-nine minutes and from the given height subtract four-tenths of a foot. To obtain the local times of high and low water, subtract from the Port Townsend times in the table forty-five and forty minutes, respectively.

The peninsula between this port and Washington Harbor averages about three miles in breadth; it is high, rolling land covered with trees.

Between this port and Port Townsend the average width of the peninsula is also three miles, with a rolling country covered with trees, but with prairie and cultivation towards Port Townsend.

Port Discovery is the "admirable harbor" which was discovered by Quimper in July, 1790, and named El Puerto de Cuadra, and which had an island in front of its mouth. From here he made an exploration of Admiralty Inlet, etc., and saw the two great passages to the northward. In 1791 the Spanish discovery brig *Sutil*, Señor Don D. Galiano, and the schooner *Mexicano*, Señor Don C. Valdez, were refitted in this bay.

It was first surveyed and made known by Vancouver in May, 1792; he refitted his ships and established an observatory at the second low point, now known as Carr Point, on the western shore; and thence sent his boats on the survey of Admiralty Inlet and Puget Sound. He gave the present name to the bay after one of his ships, and it is known by no other. Some of the settlers in this bay have discovered names carved on the trees on this point, and they are supposed to have been cut by Vancouver's men.

In 1855 we found on the bluff back of Clallam Point a great number of large trees that had been twisted off or uprooted by some tornado that had blown from the southeastward. The prostrated trees were plainly visible on the sloping hillside from the anchorage.

Middle or Rocky Point.—Eastward of Cape George the general direction of the shore-line is northeast by north and the distance is five and three-fourths miles, but midway between these points there is an obtuse angle in the shore-line from which a sharp point projects out nearly one-third of a mile. The whole shore-line lies at the base of high, yellow, clay cliffs which reach four hundred or five hundred feet elevation towards the low reach of Point Wilson.

Rocky Point has a depth of five fathoms of water within one-third mile of the shore and ten fathoms at three-fourths of a mile. There is very deep water, forty to fifty fathoms, between it and Protection Island; there is also very deep water of seventy-four fathoms two miles to the northwest, and fifteen fathoms at a mile off shore thence to Point Wilson. There is no kelp out to six and seven fathoms for one and one-half miles along shore to the northeast.

The currents off this point are conflicting from its proximity to the entrance to Admiralty Inlet, the Dallas Bank, and the passage to Port Discovery.

BUOY OFF MIDDLE OR ROCKY POINT.

To mark a *small sunken rock* off Middle or Rocky Point, a *third-class nun-buoy painted with red and black horizontal stripes* has been placed in fifteen feet of water one-half mile northeast by north

from the extremity of the point and outside and close to this danger, which is *awash* at the lowest tides. Vessels should give this buoy a berth of one hundred yards.

From this buoy we have the following bearings and distances to important objects:

New Dungeness Light-house	S. 78° W.	11 miles.
Point Partridge	North	6 miles.
Point Wilson Light-house	N. 59° E.	3¼ miles.

In foggy and thick, smoky weather the lead must be kept going when approaching [illegible].

POINT WILSON.

This point lies in the southeasternmost part of the Strait of Fuca, at the entrance to Admiralty Inlet, of which it forms the western point. It is also the northwestern point of the entrance to Port Townsend.

The point bears north seventy-four degrees east (N. 74° E.) fourteen and one-fourth miles from New Dungeness Light-house, and this line passes over the northern part of the Dallas Bank nearly midway between the two points.

The high yellow clay cliffs surmounted by heavy forest run from Port Discovery towards Port Townsend and reach a height of four or five hundred feet near Rocky Point; they are very steep and break down suddenly under a hill two hundred and fifty feet high, three-eighths of a mile before reaching the extremity of Point Wilson. This point stretches out towards Admiralty Head and is formed of low, sandy hillocks covered with coarse grass. The south shore of the point sweeps to the south and again meets the high land in half a mile. Gravel and shingle show at the water line.

On the extremity of the point are the Light-house buildings.

Between Rocky Point and Point Wilson the general direction of the line of cliffs is northeast by east, and off the shore the five-fathom line is less than one-fourth of a mile distant, except within two-thirds of a mile of Point Wilson, where it reaches out half a mile over a very rough rocky, and shingly bottom with a field of kelp to mask it. The kelp field is well off the point on the north side of the slight bight just west of the low extremity. The ten-fathom line lies about two-thirds of a mile from the shore. Directly off the point towards Admiralty Harbor a depth of twenty fathoms is found one hundred yards from the beach, and the currents make by it with great velocity. During the ebb tides a very strong eddy current sets to the eastward along the shore from Middle or Rocky Point, and even as far as Port Discovery. In 1855 when we were coming out of the inlet on the large ebb with scarcely any wind we kept outside of the rip short of the line of the eddy. A vessel two or three miles ahead was in the eddy at the same time. We were carried past Protection Island, but she was drifted back to Point Wilson. The boats, when bound to New Dungeness, keep well out in the ebb. Vessels working out from Port Townsend with the strong summer winds hold well under the southeast shore of Point Wilson, carrying three fathoms within two hundred and fifty yards of the beach southwest of the Light-house, and round the point close aboard.

In approaching the point from the strait in foggy or thick, smoky weather the fog whistle on the point will give sufficient warning; but if it should not be heard the lead must be kept going.

LIGHT-HOUSE ON POINT WILSON.

The Light-house is very near the extremity of the point, where it is not more than [illegible] above the level of the sea. The structure consists of a keeper's dwelling of one and a half stories high, painted white. From this house rises for a short distance above the roof the square tower painted white and surmounted by a lantern and dome painted black. The fog-signal house is painted white and adjoins the dwelling towards the water front.

As seen from the water the buildings show as a cluster of white houses with dark roofs on the low point, at the extremity of which is a flag-staff. There are low, straggling trees behind them and reaching to the high cliff covered with large firs and pines.

The light was first exhibited December 15, 1879, and shows every night from sunset to sunrise a *fixed white light* of the fourth order of the system of Fresnel, illuminating two hundred and seventy degrees of the horizon.

The height of the focal plane is forty-six feet above the base and fifty-three feet above the

mean level of the sea, and under ordinary conditions of the atmosphere it should be seen from a height of—

10 feet at a distance of 11.9 miles.
20 feet at a distance of 13.4 miles.
30 feet at a distance of 14.6 miles.

The geographical position, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	48° 08′ 39″	north.
Longitude	122 45′ 14″	west.
Or, in time	8h 11m 00s.9	

In January, 1885, the magnetic variation was 22° 28′ east, and was decreasing annually 4′.

The bearings and distances to important points are given as follows:

Rocky Point Buoy (red and black horizontal stripes)	S. 59° W.	3½ miles.
New Dungeness Light-house	S. 74° W.	14½ miles.
Red Buoy off New Dungeness	S. 76° W.	13½ miles.
Race Island Light-house	S. 79° W.	32½ miles.
Esquimalt Light-house	N. 84° W.	32½ miles.
Victoria Light-house (not intervisible)	N. 82° W.	30½ miles.
Discovery Island Light-house	N. 74° W.	25 miles.
Black Buoy on Partridge Bank	N. 52° W.	7¾ miles.
Smith's Island Light-house	N. 45° W.	11 miles.
Red Buoy off Point Partridge	N. 40° W.	5¾ miles.
Admiralty Head Light-house	N. 52° E.	3½ miles.
Red Stake Light on Point Marrowstone	S. 72° E.	3½ miles.

It is reported that for some years a shoal spit has been making off this point, and now a berth of one-quarter of a mile is safe in rounding it.

FOG-SIGNAL AT POINT WILSON.

Between the Light house building and the extreme point there is a small white building for the fog-signal apparatus. This is a twelve-inch *steam whistle* sounded every minute in thick and foggy weather. The *length of the blast* is *eight seconds* and the *length of the interval between the blasts is fifty-two seconds.*

Vessels entering Admiralty Inlet from the Strait of Fuca stand for Admiralty Head Light on an east by north one-fourth north (E. by N. ¼ N.) course, having Point Wilson Light-house open on the starboard bow; and when Point Wilson Light-house bears southwest by south one-quarter south, distant one and one-third miles, Point No Point Light will be open through the middle of the inlet bearing south fifty-two degrees east (S. 52° E.), distant sixteen and two-thirds miles. In that position a vessel is rather nearer Admiralty Head than Point Wilson, and the course to Point No Point clears Marrowstone Point nearly half a mile, Bush Point half a mile, and Double Bluff nearly a mile, so that the course must be changed as hereafter described.

Point Wilson received its present name from Vancouver in 1792. In 1857 a small unfinished log hut, called Fort Mason, stood upon it.

QUIMPER PENINSULA.

Between Port Discovery and Port Townsend lies a peninsula averaging three miles in breadth and ten miles long. It is reasonably undulating land and has many large farms. It offers great advantages as a location for a commercial town, and in time it will be connected directly by rail with the Columbia River by way of the Cowlitz Valley.

POINT PARTRIDGE.

This is the western point of Whidbey Island, the eastern boundary of the Strait of Juan de Fuca. It may be considered the northern part of the entrance to Admiralty Inlet and Puget Sound, with Point Wilson as the northwestern point; although Admiralty Head and Point Wilson are, strictly considered, the two points of the entrance. At any rate it is described here as forming part of the shores of the Strait of Fuca.

The seaward slope is very steep and shows large areas of sand and sandy soil. The coast-line is level on the summit, which is covered with spruce, fir, and cedar. There are two noticeable cultivated farms on the shore about three miles to the northward of the point. The point is so rounding that it is not easily recognized on coming from the westward, but from the south and

north it is well marked and prominent. Its face is composed of loose yellow sand, which, being blown up the hill by the strong west winds, has formed a very peculiar ridge on the outer face of the top. This is so narrow that it can hardly be traveled, and in many places it is thirty feet above the ground inside; yet being overgrown with bushes, the ridge is now permanent.

The highest part of the point is about two hundred and sixty feet above low water.

Although the water off this point is quite bold, yet the bottom drops off so suddenly that in foggy or smoky weather vessels running by the lead may be unexpectedly upon a bowlder reef which extends out half a mile from the point and is marked by kelp very nearly to that depth. [illegible] east of the point the ten fathom curve is less than half a mile off shore, but off the point to the northward the ten fathom curve is fully four-fifths of a mile from the shore. The [illegible] shore south of the point runs east southeast and west-northwest and in line with the direction Partridge Bank, so that the ten fathom lines are hardly a mile apart, yet there is a depth [illegible] fathoms in that width.

Off the end of the bowlder reef in five to ten fathoms the currents are very strong and there is much boiling and overfall at the changes.

The triangulation station of the U. S. Coast and Geodetic Survey is on the southern [illegible] the point, and its geographical position is:

Latitude	48°	12′ 55″.0 north.
Longitude	122	45 31 .4 west
O, in time	8h	11m 02s.1.

BUOY OFF POINT PARTRIDGE.

To mark the outer end of the bowlder reef which lies close under the shore of Point Partridge, a *second-class can buoy painted red and numbered* **2** has been placed in thirty-one feet of water just outside the kelp and about one-half a mile west of the extreme outer part of the point. Vessels passing northward under the western shore of Whidbey Island must leave it on the starboard hand. A vessel coming from Rosario Strait to Admiralty Inlet must have it on the port hand.

From this buoy the following bearings and distances to prominent objects locate it:

Smith's Island Light-house	NW. ½ W.	6 miles.
Buoy on Partridge Bank	W. by N. ½ N.	2¾ miles.
Point Wilson Light-house	SE. by S. ½ S.	5 miles.
Marrowstone Point (red stake light)	SE. ¾ E.	8¼ miles.
Admiralty Head Light-house	SE. by E. ¾ E.	5½ miles.

Point Partridge received its name from Vancouver in 1792.

For the description of Admiralty Inlet, Puget Sound, and adjacent waters, see under those headings, as we now return to the northern shore of Fuca Strait, commencing at the west entrance.

VANCOUVER ISLAND, BRITISH COLUMBIA.

This is the great island whose western shore for two hundred miles continues the [illegible] coast beyond the limits of Washington. The southern end of the island forms the north [illegible] of the Strait of Fuca.

This island was originally called "Quadra and Vancouver" by the Spanish commander [illegible] Vancouver, who met in the Gulf of Georgia in 1792, the former entering from the north [illegible] latter from the south, through the Strait of Juan de Fuca. The name Quadra has fallen [illegible] disuse.

LIGHT HOUSE AT CAPE BEALE, BARCLAY SOUND.

From Tatoosh Island the mountains of the Sommerset Range on the coast of Vancouver Island are readily seen. They rise to over two thousand feet elevation and mark the [illegible] to Barclay Sound from the east southeast. The opening to that sound is fourteen miles [illegible] is open directly to the south. There are two wide entrances to it, separated by an archipelago [illegible] islands. The cape at the southeast point of the entrance through the Hecate Passage [illegible] Beale, upon the extremity of which is built the Light-house.

The structure is a square tower, painted a light stone color, and the keeper's dwelling [illegible] detached oblong building, painted the same color.

The illuminating apparatus is of the first order Catoptric, revolving, and shows from sunset to sunrise a *white light at intervals of thirty seconds*, making a complete revolution in two minutes. It was first exhibited on July 1, 1874. The Hydrography List, page 262, says: "Visible thirty seconds; eclipse thirty seconds."

The height of the tower from the base to the center of the lens is thirty-five feet and the focal plane is one hundred and sixty-four feet above the high-water level of the sea; and in favorable conditions of the weather should be seen from a height of—

10 feet at a distance of 18.3 miles.
20 feet at a distance of 19.8 miles.
30 feet at a distance of 21.0 miles.

The approximate geographical position is:

Latitude	48° 47′ 48″ north.
Longitude	125° 12′ 52″ west.
Or, in time	8h 20m 51s.5.

In January, 1885, the magnetic variation was 23° 50′ east and had very nearly reached the eastern maximum.

The light is visible from an easterly bearing parallel with the coast, round to the west by north half north (W. by N. ½ N.). It should not be brought to the eastward of east half north, because foul ground extends off the entrances to Barclay Sound. The front of the cape is closely bordered by rocks, but a depth of fifteen fathoms of water is found one mile off the shore. *Mariners, however, should not attempt to enter the sound at night without local knowledge or a pilot.*

From this light Tatoosh Island Light-house bears south sixty-one degrees east (S. 61° E.), distant thirty and one-half miles.

Barclay Sound was discovered by Captain Berkely, of the *Imperial Eagle*, in 1787.

BONILLA POINT, VANCOUVER ISLAND.

This is a moderately low point heavily wooded to the water's edge, but is backed by wooded mountains reaching two thousand five hundred feet elevation within six miles of the shore. It is not made out by vessels entering the strait, but is seen as a low point with slowly rising background when a vessel is twenty to twenty five miles inside the strait. It is twelve and a quarter miles north thirty degrees west (N. 30° W.) from Tatoosh Island Light-house.

The chart lays down a small rock and reef close to the shore of the point, with kelp thence to the Carmanah Cove to the westward. In the northwest angle of this cove there is an Indian village.

The approximate geographical position of Point Bonilla is:

Latitude	48° 35′ 30″ north.
Longitude	124° 44′ 00″ west.

This point was named Point Duflin by Meares, after his first officer, who explored this coast in 1788.

Westward from Point Bonilla the shore-line has a general direction west half north (W. ½ N.) for twenty-two and a half miles, to Cape Beale Light house. Eastward the shore-line is almost straight to Race Rocks Light-house, west half north (W. ½ N.) fifty and a half miles. In forty miles this shore is broken only by San Juan Harbor; the shore-line is backed by broken, rocky cliffs usually not more than fifty feet high, and behind these the country rises in long slopes to high mountains that reach three thousand feet in height and perhaps more. The whole is densely wooded from shore-line to mountain-top, and only here and there are there any signs of small valleys to break the uniformity of the forest of firs.

The depth of water along this shore is quite great, but not equal to that under the southern shore of the strait. From Bonilla Point to the Sombrio River the ten-fathom line is generally less than half a mile from the shore; eastward of that it reaches out as much as two miles in two places before reaching Sherringham Point, where the deep water again comes close under the cliffs.

Vessels are apt to lose much of the wind when close under either shore; and the currents are strong, but stronger under the American side. When beating into the mouth of the strait we have found a strong ebb current across the whole breadth that averaged more than three miles per hour. The deep channel, carrying over one hundred fathoms of water, which comes through the strait, reaches a little farther west than Point Bonilla, and then turns sharply to the south-southwest, running south of the latitude of Cape Flattery.

The *landfall* behind Point Bonilla is the mountain called "House Cone," which rises to a height of two thousand five hundred feet. It is seven miles from the nearest shore, and bears north

thirty-seven degrees east (N. 37° E.) nine miles from the point, and north thirty-four degrees west (N. 34° W.) eight miles from Owen Point at Port San Juan. It is in—

Latitude	48° 29′ 40″ north.
Longitude	124° 32′ 30″ west.

Point Bonilla Light-house.—The site which has been selected by the Canadian Government for a light-house at this point is on a projection of the land a little to the westward of the point, where a landing can be secured.

PORT SAN JUAN, VANCOUVER ISLAND.

This is the first break in the uniform shore-line of the north shore of the Strait of Juan de Fuca inside the entrance. The middle of the mouth of the port bears north twenty-seven degrees east (N. 27° E.) thirteen and a third miles from Tatoosh Island Light house.

The mouth is one and three-fourths miles wide, and the harbor maintains a width of one and a quarter miles, with a general direction northeast by north for four miles to the head. So the harbor is broad open to the heavy southwest swells of winter.

Tatoosh Island Light house is plainly visible from the harbor. When the port is seen from the entrance of the strait in clear weather, but with all the high wooded mountains of Vancouver Island in cloud, the entrance to San Juan Harbor is like a broad passage between high wooded hills on each side, while to the eastward is seen the depression through which the Sombrio River comes from the north and eastward.

The two points at the entrance of the port lie west half south and east half north from each other. That to the west is named Owen Point; it is a low rocky point with rising wooded ground behind it. Outside of it a little more than two hundred yards there is a low, flat rock awash at high water. It is named Owen Rock. The eastern point is named San Juan; it is a low rocky projection, and the land rises very slowly behind it.

Inside of this point and under the northwest shore of the bay foul ground and rocks extend for a mile to the northeast. *One sunken rock* visible at the lowest tides lies northeast quarter east (NE. ¼ E.) eight hundred yards from the point and two hundred and seventy-five yards from the nearest shore. About two hundred and fifty yards outside of the point towards Cape Flattery the *Observatory Rocks* are high pinnacles with two or three trees growing on them. Smaller rocks lie close outside the pinnacles.

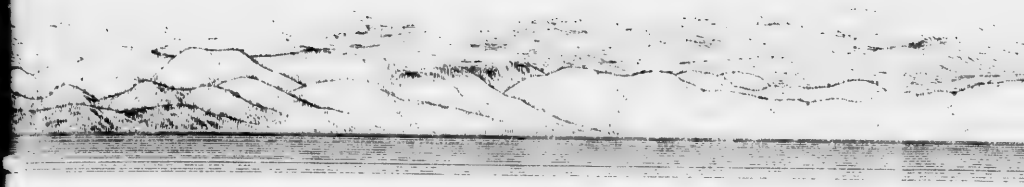
Inside the point about a third of a mile and two hundred and fifty yards off the rocky shore there is another reef partly out of the water; it is named the Hammond Reef.

The shores of the bay are steep, high, and rocky, and backed by heavily timbered hills and mountains. In very clear weather it is difficult to distinguish the entrance at a distance unless one is acquainted with the locality, but in moderately hazy weather the indentation is easily made out.

The head of the bay terminates in a slight receding beach of muddy sand. Into the northernmost angle of the bay the Gordon River empties through the northwest end of the beach. On this river is a large Indian village called Onismah.* Cooper Inlet opens into the northeast angle of the bay at the southeast end of the beach. Very small coasters may enter these streams towards high water, and find depth and shelter within. Across the entrance of the port a depth of ten fathoms is found, except near Observatory Rocks,* close to which seventeen fathoms water is found. Outside the entrance to the port we find from fifteen to twenty fathoms; inside the bottom is very regular in seven to ten fathoms up to the head, where it deepens evenly to four, within half a mile of the beach at the head, from which a flat extends out a hundred yards. The bottom is fine, muddy sand. The eastern side of the port has the least number of rocks, and a mid-channel course clears everything well. In moderately heavy southerly weather a heavy swell rolls straight in, and the swell breaks when it reaches depths of four fathoms.

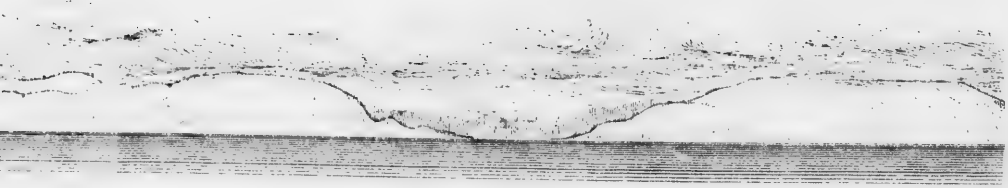
Although it is probable a vessel with good ground-tackle would ride out a gale if anchored in the most sheltered part, it is by no means recommended to remain there with any indication of such weather, but to weigh immediately, and if outward bound to seek shelter in Neeah Bay, the entrance to which bears from San Juan nearly west, ten and a half miles distant. Good anchorage will be found about one and a quarter miles from the head of the bay, with Owen Island bearing southwest, and Adze Head, on the opposite shore, bearing east-southeast; seven fathoms. (Richards.)

*Admiralty chart, 1847.



Point Bonilla, N. by E. ¾ E., 10¼ miles.

Western Coast of Vancouver.



Owen Point, NE. ¼ E., 17 miles.

San Juan Harbor.

iles.

Western Coast of Vancouver.

The *Consort*, formerly a supply ship in the United States Exploring Expedition, drifted into this vicinity in a calm and anchored, and a large swell coming in without any wind she parted her chains and was lost.

The experience of the American lumber vessels sailing to this strait warns them never to approach the northern shore of the entrance, for the peculiar set of the currents and the large, heavy swell which gets up without warning and in a calm, gives them small chance from going ashore. We have experienced an enormous swell coming into the entrance to the strait, with a strong current running out on the large ebb and not a breath of air.

The approximate geographical position of the Observatory Rocks is—

Latitude	48° 31′ 30″ north.
Longitude	124° 28′ 15″ west.

Meares, in 1788, first noted this bay in his map, and called the western head Point Hawksbury. It was entered by Quimper in 1790, and named El Puerto de San Juan; Vancouver, in May, 1792, stretched over to this shore and plotted it on his chart with the name San Juan, which he afterward learned from Quadra. It has retained Quimper's name. It was surveyed by the United States Exploring Expedition in 1841, and by Kellett in 1847.

The *coast-line eastward from* Port San Juan is almost unbroken to Sherringham Point, distant twenty-three and a half miles exactly east. The shore is moderately low, rocky cliffs without beach, and backed by densely wooded, rising hills.

It is notable that there are no bright cliffs, but the forest comes down to the water's edge; and there appears no sign of extensive forest fires.

Providence Cove is a slight indentation nearly three miles east of Point San Juan. It is open to the south southeast, and at its head receives a small mountain stream. It is only fit for boats. Half a mile outside of it the depth of water is twenty fathoms.

Sombrio Cove.—At seven and a quarter miles east from Point San Juan is the eastern point of a recession of the shore-line for half a mile to the northward. It is a bight broad open to the southward. It receives a small stream called Sombrio River, coming in from the eastward, off the mouth of which is an extensive reef. There is a depth of ten fathoms within half a mile of this reef. From the eastern point of this cove the twenty-fathom line begins to stretch off shore nearly two miles and then runs eastward nearly parallel with the shore to abreast the opening of the Jordan River, when it moves into Sherringham Point.

There is a small rocky islet close to the point of the Sombrio bight. Two or three miles east of Sombrio River there is a piece of broken and exposed cliff, and this is not a usual feature along the north shore.

The *River Jordan* is seventeen and a half miles east from Point San Juan, and nearly six miles west from Sherringham Point, with an intermediate point projecting outside of Sherringham Point. The river is said to be a considerable stream coming from the high, wooded hills, and there are large deposits of abraded material on each side of the entrance.

Vessels working up the strait at night and bound for Victoria or the Canal de Haro must be careful not to approach the north shore so as to shut in Race Island light by Beechey Head. The light is first visible just westward of Sherringham Point.

Nearly three miles west of Sherringham Point there is an unnamed point projecting out when a vessel is close inshore; the shore recedes half a mile on the west side, and a hill lies nearly a mile to the northward.

SHERRINGHAM POINT, VANCOUVER ISLAND.

This is a rocky point with rocks under it, and very deep water within a quarter of a mile. The forty fathom line is within less than half a mile from the point. It is thirty-three miles south sixty seven degrees east (N. 67° E.) from Tatoosh Island Light-house, and almost abreast of Pillar Point, from which it bears north thirteen degrees east (N. 13° E.), distant twelve miles. It is not intervisible with Race Island Light-house, but the distance of the latter is sixteen miles north eighty-one degrees east (N. 81° E.).

There is a sharp rocky ridge covered with fern one hundred and fifty to two hundred and fifty yards wide running northward from the point for about three fourths of a mile, and rising to a height of five hundred and sixty feet; it has a sharp gulch on each side, and therefore stands out prominently and is notable from seaward. Two or three miles to the northwest of the point there

is a high, densely wooded mountain. Very frequently, in passing through the strait, all the lower part of the land on either side will be clear, but the mountains will be hidden in cloud.

This point, both for its height and the bare ridge, is more notable than the points to the east and to the west.

Eastward of Sherringham Point the shore recedes nearly one mile to the north in a long curve to Otter Point, which is a little over four miles east half north from the former. On the line of these points the depth of water reaches twenty fathoms, but decreases rapidly to three fathoms, which, on the eastward side of the point and within one and a half miles of Otter Point, reaches two thirds of a mile off shore. In a mile and a half east of Sherringham Point there is a small field of kelp. Two or three small streams enter this broad bight.

It is a question whether Quimper anchored here in 1790; if so, Sherringham Point was named San Eusebio, and Otter Point was named San Antonio.

OTTER POINT, SOOKE BAY, VANCOUVER ISLAND.

This is a sharp, rocky point, around which are clustered a good many rocks; but outside these dangers the bottom drops to twenty fathoms in less than a third of a mile.

Behind this point the land rises in a long, wooded ridge running northward, but it is not near so prominent a point as Sherringham, nor so high.

Between Otter Point and Secretary Island the course is east three-quarters north for four and three-fourths miles, and on this line the depth of water is as much as thirty-five fathoms, but decreases rapidly towards the shore.

East of the point there is a moderately deep bight, which at its eastern angle forms the entrance to Sooke Inlet. It is called Sooke Bay, and at two and three-quarters miles northeast from Otter Point, in the deepest part of the bay, there is a good watering place at a break in the cliffs.

It is quite probable that this was the point San Antonio of Quimper in 1790.

Vessels may anchor in this bay in fine weather in eight to ten fathoms of water at half a mile from the shore, but there is reported to be a rocky patch a little over half a mile to the east-northeast of Otter Point with a depth of five fathoms inside of it. In leaving this bay a vessel must have plenty of wind and have watchful care for the currents.

Quimper anchored in this bight on the 16th of July, 1790. He gave it no name.

SOOKE INLET, VANCOUVER ISLAND.

From Sherringham Point to Beechey Head the distance is eleven and one fourth miles and the bearing east half north. We have already described the indentations between Sherringham Point and Otter Point and between Otter Point and Secretary Island. In the eastern angle of the latter indentation is the mouth of the very crooked, narrow entrance called Sooke Inlet, leading to the large land locked sheet of water named Sooke Basin.*

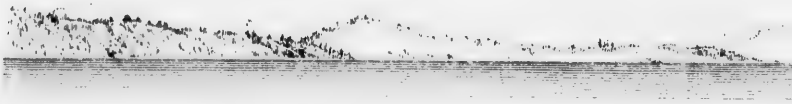
One mile to the southeastward of this entrance there is a large rocky islet, known as *Secretary Islet*, lying apparently one width or one hundred and fifty yards off the rocky front of *Point Possession*, but in reality it is four hundred yards off. As seen from the strait it is a brown, bare islet rising with long sloping sides. It has a rocky face and a lower point on the outer or south side. There are bushes and low scrub on the eastern side, and on the southwest slope there are no bushes. The English chart says it is one hundred and twenty feet high, but it does not seem so high. There is deep water close to the outer side, and even between it and the point there is a depth of twenty-five fathoms.

This large islet is a good landmark for making the Sooke Inlet from the west; there is a broken bright yellow cliff estimated to be from eighty to one hundred feet high westward of the inlet and about a quarter mile long. As there is no other bare broken cliff on the northern side of the strait except two or three miles east of Sombrio River, this mark is notable. From this yellow cliff a low sand spit makes out northeast for half a mile across the entrance to Sooke Inlet. To the eastward of this spit is the passage which is only one or two hundred yards wide, with an irregular rocky bottom and some sunken rocks. The currents run with great velocity, and a thorough knowledge of these and the channel is necessary to enter this place. When a

* Admiralty chart, 1847. The pronunciation of the name Sooke is exactly that of the English word suck. The Indian word is T'sŏk.

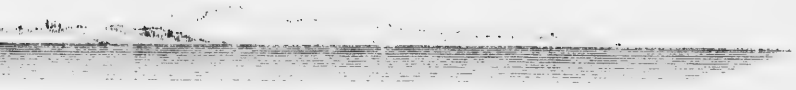
Sherringham Point (or beyond), WSW., 16 miles.
Otter Point.

Shepherd Mountain, 820 feet. Bright Cliffs.
Sooke Inlet.



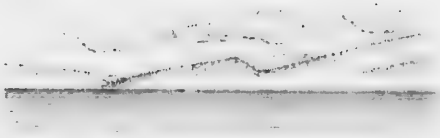
Becher Bay. Secretary Island. Cape Church.

Mount Miles.
Beechey Head, NE. by E. ½ E., 16 miles.



Mount Miles,
E. by S., 25 miles.

Mount Miles, N. ¼ E., 2½ miles.



Souke Inlet.

Vancouver Island.

Beche

. ¾ E., 2½ miles.

Bentinck Island (clouds beyond).

North Rock.

Race Rocks Light-house, NE. by E. ¾ miles.

Mount Miles.

Race Rocks Light-house, E. by N., 5 miles.

Becher Bay.

Mount Miles.

Bentinck Island

Race Rocks Light-house, NE. ¾ N., 4 miles.

ice Rocks Light-house, NE by E

N., 8 miles.

Snake Island

depth of ten fathoms is struck off the entrance, a high hill, named Mount Maguire,* will bear about northeast. It is nine hundred and forty feet in height and is partially covered with scrubby oak trees, but the bare rock shows distinctly in many places, and this feature now commences to distinguish the southeast part of Vancouver Island. The English chart of the inlet and basin will give the necessary directions. When the surveying brig *Fauntleroy* was in the basin she reported that vessels can not come out with any wind blowing. The brig dropped out close under the western point, or Whiffen Spit, by heaving the anchor short and letting the vessel drop with the current, and keeping steerage way on her to prevent her going on *Entry Ledge* abreast the point. When the point was passed the vessel was warped to the bar, where there is only two and a quarter fathoms of water and a field of kelp. An adverse wind sprang up and the vessel had to anchor. The place is only adapted to small coasting vessels or small steamers. They may anchor outside the kelp in ten fathoms of water, or in an emergency run in and anchor in the little basin on the north side of Whiffen Spit.

Sooke Inlet was first entered by Quimper on the 19th of July, 1790, and he describes it very well. He says it afforded his vessel an admirable shelter. On the 23d he took possession of the country in the name of the King of Spain and named this bay El Puerto de Revillo Gigedo. He had to be towed out and then to anchor off the entrance on account of calms.

Mount Maguire, already mentioned, is quite a landmark on this shore, because it is the first mountain made on the Vancouver coast in coming from the westward which is not covered with a dense growth of the Oregon fir. It is nine hundred and forty feet high, lies only one and two-tenths miles back from Point Possession, and is noticeable as being covered with scrub oak and other stunted trees, through which the bare rocks protrude. It lies six and three-fourths miles west two thirds north (W. $\frac{2}{3}$ N.) from Race Island Light-house.

BEECHEY HEAD, VANCOUVER ISLAND.

This is the rounding rocky point nearly five miles south seventy-seven degrees west (S. 77° W.) from Race Island Light-house. It rises rapidly from the water to about three hundred feet with the pine forest dense on the western side, a scrubby growth of pines on top, and bare brown rocky patches showing through the trees on the south face. There is no rock off the face of the point. Three miles to the westward of it is the entrance to Sooke Inlet, and on its eastern side Beecher Bay. Behind it the land rises for two and two-thirds miles, to Mount Maguire,† nine hundred and forty feet, and lying northwest from the point. The shore is bare and rocky in patches, with openings of land covered with fern and destitute of trees; and the houses of settlers are here and there located in pleasant nooks. The higher hills are wooded, with bare areas of rock showing through.

Off the head the depth of water is very great and twenty fathoms is found at a hundred yards from the craggy face of the point. The currents are very strong and irregular at the change of the tide. In this vicinity a United States revenue-cutter during densely smoky weather reported passing the bold shore with her flying jib-boom, and only struck her forefoot after the jib-boom had been carried away.

In the older charts at two to three miles south-southeast (SSE.) from Beechey Head depths of one hundred and fifty fathoms are given, but the latest examinations report only one hundred and four fathoms.

The approximate geographical position of Beechey Head is:

Latitude	48° 18′ 30″ north.
Longitude	123° 39′ 27″ west.

It was named after the English navigator, Capt. F. W. Beechey, R. N.

BEECHER BAY, VANCOUVER ISLAND.*

This bay lies to the eastward of Beechey Head, with Cape Church or Smith Head and the rocky islets off it for marking the eastern point. These islets are wooded and named the *Bedford Islets*. *Cape Church* is the outer point. We estimated it to be two hundred and fifty feet high, with a brown rocky face, quite steep, with patches of pine on the flanks, and a few pines on top. Two of the islets are so close under the cliff that they are not distinguishable from it when a vessel is

* Admiralty chart, 1847.

† On the Admiralty chart, 1907, of Sooke Inlet the name of this mountain is McGuire, and the height given is six hundred and forty feet.

one or two miles outside. Hence for one mile to the west-northwest, to Smith Head, there are three or four rocky islets. The outer one is about twenty-five feet high, and bare rock; the inner one is bare rock, and five or ten feet high.

The entrance of this bay is one and one-third miles wide, and it runs back with the same width for one and a half miles. The shores are very rocky and jagged and guarded on the eastern side by many rocky islets. Two large islets lie in the northern part of the bay. The one in the northeast angle is Frazer Island, and that in the northwest is Wolf Island. The passage for anchorage is between these two islets, with twenty fathoms of water, and after passing Frazer Island the course is northeasterly for three-quarters of a mile, where anchorage is had in [illegible] fathoms, with the center of Frazer Island bearing south-southwest, distant a quarter of a mile.

The bay is inclosed by rocky hills, but it can not be recommended as a good anchorage.

It affords no great shelter, with a southerly or westerly wind, and vessels outward bound had better [illegible] wind in Parry Bay, four miles to the north-northwest of the Race Rocks.

Vessels bound up the strait should pass the land about Beechey Head at a distance of two miles if [illegible] go outside the Race Islands. (Richards.)

Mount Miles.—This is a moderately high, round-topped hill lying within half a mile of the shore just east of Cape Church. It has probably been burnt over and shows no trees for two thirds of its height from the summit on its southwest face; but a straggling forest lies on the western slope more than half way up, and another clump on the northerly side near to the summit. It is a feature in the approaches to the Race Rocks, and lies two miles west by north from Race Island Light-house. It is about five hundred or six hundred feet high.

THE RACE ROCKS OR RACE ISLAND, VANCOUVER ISLAND.

These small rocky islets lie close off the southeasternmost point of Vancouver Island at the eastern part of the Strait of Fuca, where it opens towards the north and east to nearly double its general width. At this point they seem to contract the width of the channel fully one and a half miles, and at the same time form a danger on a route of large traffic. The strait is here at its narrowest part, being only seven and three-fourths miles wide between the outermost danger of the Race Rocks and the shore-line at Point Angeles, which lies south by east half east therefrom. From the Race Rocks the shore-line takes a northerly direction for eight miles, to Esquimalt and Victoria Harbors, etc.

This cluster of small rocky islets numbers about ten principal ones, which are embraced in an area about one mile long northwest and southeast and half a mile wide. They are quite low, and the larger ones are covered with grass but without trees or bushes. The largest is about three hundred yards in extent and twenty-five feet above the sea. The innermost islet lies half a mile from the nearest point of Bentinck Island, which is a low wooded island one mile long close under the Vancouver shore. Through this half mile passage there is very broken bottom from three to six fathoms, with strong, irregular currents. The outermost visible rock outside the Light-house is a little over a mile from Bentinck Island, but stretching southeastwardly therefrom for half a mile the bottom is very irregular with two points of *sunken rocks*. The outer one of these dangers is the *Rosedale Rock*, having only five feet of water upon it; it lies two-fifths of a mile southeast from the Light-house. Outside of this danger the depth of water drops off to twenty fathoms to the southward, but towards the east for half a mile a ridge has partially developed having eight fathoms of water upon it. This outer sounding of eight fathoms is four-fifths of a mile by south two-thirds south (E. by S. ⅔ S.) from the Light-house.

The currents rush around and through the islets and over the reefs with great velocity and irregularity as we have measured. In light airs a sailing vessel must give these dangers a good berth, especially if the current is ebb, because it sets strongly towards them. Steamers have drifted upon the rocks in a calm, and there is little chance for escape. In bad weather the current rips are dangerous.

There is kelp among the islets on the northwest side towards Bentinck Island.

LIGHT-HOUSE ON THE RACE ROCKS.

The tower on the great Race Rock is the frustum of a cone rising about a hundred feet from the rock and one hundred and eighteen feet above high water, and since the 1st day of October, 1864, it has been painted in alternate horizontal broad bands of black and white. There are four bands painted black and two bands white. The lantern and fixtures are painted red. The

Olympic Range in clouds. Striped Peak, 1
Race
S. by

940 feet, 7 miles.
ouse, W. ¼ N., ⅞ mile.

Rocks Light-house.
E. ¼ E., 1¼ miles

Olympic Range in clouds.

Striped Peak, 1,250 feet, S. by W., 16 miles.
Race Rocks Light-house,
S. by W. ½ W., 5¼ miles.

Beechey Head, W. ½ S., 6 miles.

Cape Church.

Bentinck Island.

Douglas Island, or Ce

Mount Miles (Vancouver Island)

Cape Church.

Mount Maguire, 340 feet, 7 miles.
Race Rocks Light-house, W. ¼ N., ¾ mile.

Douglas Island, or Cedar Hill, 691 feet.

Race Rocks Light-house,
N. by E. ¾ E., 1¼ miles.

keeper's dwelling house is of stone and two stories high; it lies on the landward side of the tower and close to it. The roof of the dwelling is nearly on a level with the middle of the lowest black band. One or two small white buildings are on the northeast part of the rock.

The illuminating apparatus is of the second order of the system of Fresnel, and was first exhibited January 1, 1861. It is a *white light which shows a bright flash every ten seconds* through every night from sunset to sunrise.

Under favorable conditions of the atmosphere it should be seen from a height of—

10 feet at a distance of 16.1 miles
20 feet at a distance of 17.6 miles.
30 feet at a distance of 18.8 miles.

The geographical position of the Light-house was determined by the U. S. Coast and Geodetic Survey, as follows:

Latitude	48	17′	53″.5 north.
Longitude	123	31′	47 .0 west.
Or, in time	8h	14m	07 .1.

The magnetic variation for January, 1886, was 22° 37′ east with no annual change, as the variation has reached its maximum.

From the Race Island Light-house we have the following bearings and distances to important objects:

Sherringham Point	S.	83½	W.	16 miles.
Tatoosh Island Light-house	S.	72	W.	18⅛ miles.
Pillar Point	S.	53	W.	23¼ miles.
Red Buoy off Crescent Bay	S.	26	W.	10½ miles.
Ediz Hook Light-house	S.	51	E.	11 miles.
New Dungeness Light-house	East.			18 miles.
Point Wilson Light-house	N.	84	E.	32⅛ miles.
Admiralty Head Light-house	N.	81½	E.	35 miles.
Partridge Bank Black Buoy	N.	72½	E.	27⅞ miles.
Smith's Island Light-house	N.	65	E.	27⅛ miles.
S. W. Island off Watmough Head, Rosario Strait	N.	54	E.	29 miles.
Discovery Island Light-house	N.	36½	E.	14⅛ miles.
Victoria Light-house	N.	15	E.	9⅛ miles.
Esquimalt Light-house	N.	2	E.	8⅝ miles.

FOG-ALARM SIGNAL AT RACE ROCKS.

A fog signal has been established at this Light-house. The first one, in 1872, was a fog-bell. Since August 18, 1882, a twelve inch *steam fog-whistle* has been in use. It is placed close under the southeast side of the Light-house, and is sounded during foggy and smoky weather with "*blasts of five seconds duration, with intervals of one minute and twelve seconds between the blasts.*"

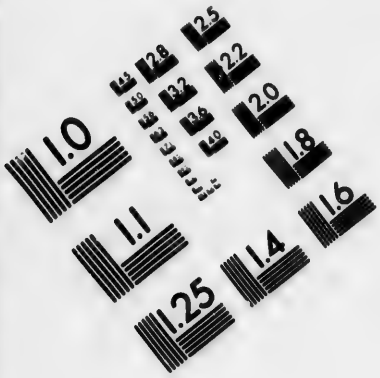
Race Rocks Passage.—There is a clear passage of two fifths of a mile in width between the outermost of the Race Rocks and the rocky shore of Bentinck Island towards the northwest. It has a bottom of very variable depth from thirty to six fathoms.

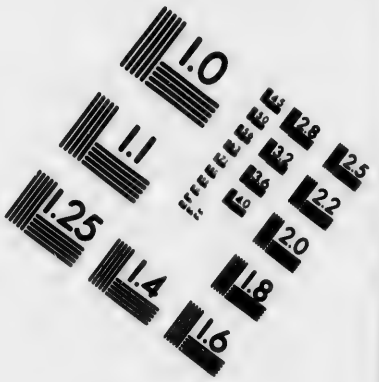
Small steamers from the westward entering to take this passage should pass within half a mile of Cape Church and keep the land aboard at that distance until up with Bentinck Island (which will be made out as separated from Vancouver shore by a narrow channel full of rocks), when Bentinck Island should be approached to within one-quarter of a mile, or just outside the kelp.

Strong currents run through this passage and with much irregularity. When the current is with her some of the large steamers from Victoria bound out of the strait run through the passage and pass it in ten minutes.

Under ordinary circumstances a sailing vessel should not approach this passage or the Race Rocks within a mile or two.

A case may arise, however, either inward or outward bound, when a vessel overtaken by a strong southeaster would do better to run through than risk weathering the great Race Rock by less than a mile; if so the Bentinck Island shore should be kept aboard, at the distance of two cables, or just outside the kelp line (on that side of the passage), for the northernmost rock, which forms the southeastern side of the passage, is covered at high water, and the strongest tides [currents] and eddies are found in its neighborhood. The course through is north-northeast and south-southwest. (Richards.)





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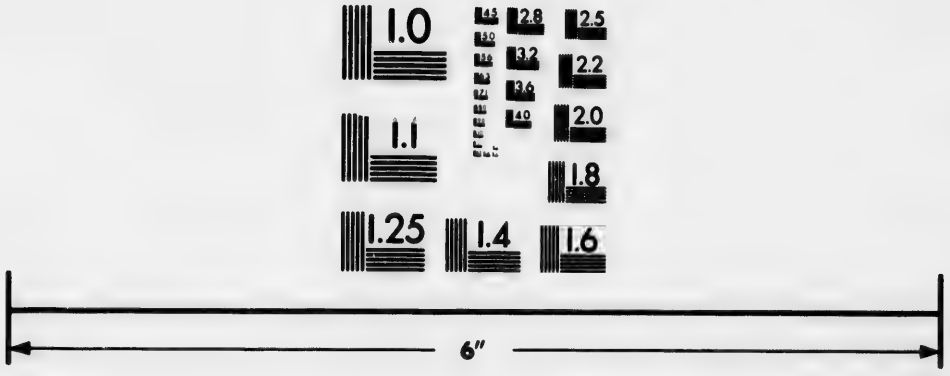

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The small vessel with which Quimper made his first reconnaissance in this region in 1790 sailed to the eastward through the Race Channel. He says they entered by passing between four islets and a larger one near the land; upon passing through they opened a large and beautiful gulf, which they named Eliza. The larger islet was Bentinck Island.

DIRECTIONS FOR ESQUIMALT AND VICTORIA HARBORS FROM THE RACE ROCKS.

We do not propose to describe Pedder Bay, William Head, Parry Bay, Albert Head, or Royal Roads. They are given in detail by Richards in his Vancouver Island Pilot.

The great bight between the Race Rocks, Esquimalt Harbor, and Discovery Island was named the Gulf of Eliza in July, 1790, and described as large and beautiful. It has no special name at present.

The general direction of Esquimalt Harbor from Bentinck Island inside Race Rocks Light-house is north one-quarter east (N. ¼ E.), and the distance is eight and a quarter miles; from Esquimalt Harbor to Trial Island the course is east half north, and the distance is six miles, but the two are not intervisible.

Along the shore between Esquimalt Harbor and Bentinck Island and from Trial Island the currents run out with great velocity with a general set towards the Race Rocks. The depth of water in this open gulf averages forty fathoms.

Pedder Bay and Parry Bay in this gulf are very probably the Bay of Valdez and the Bay of Solano of Quimper, whence his mates reconnoitered to Haro Strait.

The Light-house tower of the Race Rocks can be distinctly seen at a distance of twelve miles, so that it is readily seen from the open gulf hence to Trial Island. We have already given special directions for avoiding the dangers that surround them.

Vessels bound to Esquimalt Harbor and clearing the Rosedale Rock by half a mile will open Esquimalt Harbor, bearing north three quarters west, distant eight and three-quarters miles. As the white tower at Esquimalt entrance is nearly sixty feet high it is readily seen in clear weather and a course may be laid from it. If bound for Victoria Harbor the light bears north half east, distant nine and one-half miles.

ESQUIMALT HARBOR,* VANCOUVER ISLAND.

We have already described the general location of Esquimalt Harbor. This excellent bay is where all the British men-of-war lie, and it contains a small naval dock-yard in the southern part of Constance Bay, called Royal Bay.† The entrance is a quarter of a mile wide, and has two rocky heads on either hand, the western head having Fisgard Island‡ and the Light-house off it, and the eastern having the outlying Scrogg sunken rocks south of it, with several islets. From the entrance the general direction of the bay is north-northwest, and the extreme length two miles; the average width is half a mile. After passing the heads the harbor opens to the east, forming a small beautiful bay, called Village Bay or Constance Cove (sometimes Man-of-war Cove), where men of war anchor in a uniform depth of six fathoms. In the entrance are seven and eight fathoms of water, and the approaches for a mile give from ten to thirteen fathoms.

(For the details of Esquimalt Harbor, the dangers, etc., see the Vancouver Island Pilot.

At the head of the harbor is Mount Seymour,§ four hundred and sixty feet high.

Inland and five miles west of the head of Esquimalt Bay is the head of a large bay coming from the north and opening into the inside channel to the Nanaimo coal mines.

THE LIGHT-HOUSE AT ESQUIMALT HARBOR.

This Light-house is erected on Fisgard Island, a small rocky islet, twenty-five feet above the water. The islet is almost connected with the shore, and forms the western point of the entrance to Esquimalt Harbor. The eastern point is Duntze Head, and the entrance is only six hundred yards wide, but the bay opens out beautifully inside.

* The Indian name is Isch-oy-malt, and it is so written in the early letters of the Governor of the Hudson's Bay Company.

† Admiralty chart, 1847.

‡ English chart, 1851, called it Fishguard; the latest is Fisgard.

§ Admiralty chart, 1847.

The structure consists of a round tower of brick whitwashed and elevated fifty-seven feet above the rock, with a red brick keeper's dwelling adjoining. The tower is surmounted by a lantern painted red. As seen from the approaches it shows as a tall, white, slim tower projected against the dark, fir-covered bluffs behind it.

The illuminating apparatus is of the fourth order of the system of Fresnel. It was first exhibited November 19, 1860, and shows every night from sunset to sunrise two colors in different parts of the arc, with a large arc eclipsed.

The total arc of visibility is two hundred and twenty-seven degrees. Of this the *white light* shows from south three and a half degrees east (S. 3½° E.), just clearing Rosedale Rock to the southeast of Race Rocks Light-house, round to south sixty degrees east (S. 60° E.). Then the *white light* changes to a *red light* from south sixty degrees east (S. 60° E.) round through the east and north to north nine and a half degrees west (N. 9½° W.) inside the harbor. At this bearing the *red light* changes to a *white light*, which shows from north nine and a half degrees west (N. 9½° W.) to north fifty-one and a half degrees west (N. 51½° W.) and is then *eclipsed*. The *eclipse* of the light extends from north fifty-one and a half degrees west (N. 51½° W.) round by the west over the land through the south to south three and a half degrees east (S. 3½° E.) just east of the Rosedale Rock, where the *white light* begins.

The focal plane of the light is seventy feet above the level of the sea at high water, and in favorable states of the atmosphere should be visible from a height of—

10 feet at a distance of 13.2 miles.
20 feet at a distance of 14.7 miles.
30 feet at a distance of 15.9 miles.

The geographical position of the Light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	48°	25′	49″.9 north.
Longitude	123°	26′	45″.4 west.
Or, in time	8ʰ	13ᵐ	47ˢ.0.

This light is known as the Fisgard Island Light on the English charts.

It will be seen from the foregoing description of the light that its characteristics have been changed from the original system. Then there was a white, a red, and a green light for certain conditions. The *green* light has been abolished.

When a vessel is coming up the strait from the westward bound to Victoria or the Haro channel, the fixed white light of Esquimalt Harbor will be seen as soon as the vessel is to the eastward of the Rosedale Rock off the Race Rocks Light-house. The light should be steered for on the bearing north half west, which will lead close to the reef extending a short distance off Albert Head, which is five and three-quarters miles north one fifth west of Race Island Light-house. While a vessel keeps the white light of Esquimalt in full view she is clear of all known dangers to the westward. If she gets too far to the westward the light will be lost, and she should immediately steer to the eastward till it is again seen. This precaution is necessary on account of the currents which during spring tides run as much as six knots an hour in the neighborhood of the Race Rocks. The ebb current runs almost in a direct line from the Canal de Haro to the rocks, and sets between them and the shore with great force and irregularity. There are also tide currents in the vicinity dangerous to boats and small craft.

When to the northward of Albert Head, and wishing to anchor in Royal Bay, at the approach to Esquimalt Harbor, a vessel should bring Esquimalt light to bear north by west, when she will have ten fathoms, with good holding ground, about one mile from the light; or, if desired, she may stand to the westward until the white light is lost, when she should *immediately* anchor.

In entering Esquimalt Harbor the light changes from *white* to *red* when it bears north sixty degrees west (N. 60° W.), and it should be left from three hundred to four hundred yards on the port hand to clear a reef and sunken rock extending one hundred and seventy yards to the northwestward of the light. The depth of the water in the approaches and in the entrance is eight to ten fathoms over a very regular bottom. Inside, when the red light bears south by west, a ship may anchor in seven fathoms or stand into Constance (or Man-of-war) Cove carrying six fathoms over a level bottom of mud. When inside the harbor and the light bears south nine and a half degrees east (S. 9½° E.) the red light changes to a white light to the westward, where the shoal off Yew Point, and the sunken danger, Whale or White Rock may bring a vessel up.

The *red light* is useful to vessels bound to Victoria or Esquimalt Harbor from the eastward. After a vessel rounds Trial Island bound for Esquimalt Harbor a west-southwest course will lead a safe distance outside of Brotchy Ledge and bell-buoy, and should be continued until the Esquimalt Light changes from *red* to *white*, when it may be steered for and not before. At this change the light bears north sixty degrees west (N. 60° W.), and that course passes one hundred and forty yards outside of the outermost danger of Scrogg rocks, which are within two fifths of a mile of the Light-house.

Fisgard Island has kelp around it, and in day time the line of safety is just outside the kelp, which extends one hundred yards towards the channel. On the edge of this kelp is a *sunken rock* with seven feet of water on it, one hundred and seventy-five yards northeast of the Light-house.

For details of the harbor, anchorage, winds, currents, etc., see Vancouver Island Pilot, and Admiralty chart, 576.

Tides at Esquimalt Harbor.—The Admiralty chart, 576, gives the following data about the tides: It is high water at the full and change of the Moon from May to October between midnight and 1H^h^ next morning; and from November to April from noon to 1H p. m. The spring tides rise seven to ten feet, and the neap tides rise five to eight feet; with strong winds from the southwest and southeast the tides rise two feet above ordinary spring-tides. It will be better to take the tides from Tide Tables for the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

From Esquimalt Harbor Light we have the bearings and distances to the following important points:

Race Rock Light-house	S. 2 W.	¾ miles
Ediz Hook Light-house	S. 31 E.	17½ miles
New Dungeness Light-house	S. 67 E.	20 miles
Point Wilson Light-house	S. 84 E.	32¼ miles
Partridge Bank Black Buoy	N. 87 E.	26 miles
Smith's Island Light-house (not intervisible)	N. 80 E.	21 miles
Brotchy Ledge White Spar-buoy	S. 79 E.	2¼ miles
Trial Island, south end (not intervisible)	N. 85 E.	6 miles

VICTORIA HARBOR, VANCOUVER ISLAND.

The general precaution for the approach to Victoria Harbor upon rounding Race Rocks may be taken the same as for Esquimalt Harbor.

The course for the entrance to Victoria Harbor, after rounding the Race Rocks Light-house, is north three-quarters east, and when Esquimalt Light changes from *bright white* to *red* a vessel will be one mile from the shore in thirty-three fathoms of water over sandy bottom.

Ships above the size of coasters, unless acquainted with the locality, are recommended not to run for Victoria at night, when they can not enter, but rather to anchor in Royal Bay for daylight. The limit of anchorage there, when a vessel stands to the westward, is to anchor *immediately* when the bright white light is eclipsed. This will give ten fathoms of water over mud within a mile of Esquimalt Light-house. With southeasterly and stormy weather a ship bound for Victoria should immediately run into Esquimalt Harbor, which she can easily do with the assistance of the Light-house on Fisgard Island.

The entrance to Victoria Harbor is two and a quarter miles east of Esquimalt. As the channel is very contracted, crooked, and obstructed with a nine-feet bar, vessels usually anchor outside in ten or fifteen fathoms of water, taking care to avoid Brotchy Ledge,* with only five feet water upon it. This danger lies about half a mile south southeast from the eastern headland, southwest three-quarters west from Mount Beacon,* upon which was a range mark with it on the immediate shore. It is one mile southeast by south one-quarter south (SE. by S. ¼ S.) from Victoria Light-house. The ledge is marked by a white spar-buoy (formerly a bell-buoy) just southwest of the rock. The channel inside is well marked out by buoys, but a pilot is necessary to carry a vessel in. The whole length of the harbor is about three or four miles, with an average width of one-fifth of a mile. It is very tortuous, and the head stretches west nearly to the head of Esquimalt Bay, where a portage exists.

The approaches to the harbor are deep outside of Brotchy Ledge, and from ten to twenty fathoms of water are found inside of it. The shores adjacent are low, but rocky, and covered in part with trees, reminding one of the rocky parts of the coast of Massachusetts and Maine.

* On the English Admiralty chart, 1847.

For details of Victoria see the Vancouver Island Pilot.

The ocean steamer wharf is now located on the eastern shore just inside the outer head and just outside the Light-house (which is on the western side), so that these large vessels run directly towards it in coming from sea and leave it without trouble.

LIGHT HOUSE AT VICTORIA HARBOR.

Two-fifths of a mile inside the western point of the entrance to Victoria Harbor a Light-house has been built on the western side in the narrowest part of the entrance, upon the second small rocky islet lying so far in that it can be seen over the bar inside and directly into the harbor. This islet is named Berens, and is about fifteen feet above high water; there is a depth of ten feet close to its southeast face.

The Light-house structure is the frustum of a square pyramid. It is built of wood, and is thirty feet high from base to vane. It presents two windows on the seaward side. The lantern is on top of this tower, and it is painted red. There is a keeper's dwelling attached, and all are painted white.

The light was first exhibited March 1, 1876, and is intended as a harbor light; it shows from sunset to sunrise a *fixed blue light*, which is elevated forty-four feet above high water. Under favorable conditions of the atmosphere this light should be visible at a distance of six or seven miles.

FOG-BELL AT THE LIGHT-HOUSE AT VICTORIA HARBOR.

According to the official notice of April 5, 1887, a fog-bell has been erected at the Berens Island Light station at the entrance to Victoria Harbor. The bell is suspended from a roofed framework on the seaward side of the Light-house tower, and will be rung by hand, but only in answer to steamers blowing their whistles on entering in thick weather.

There is a *white spar-buoy on Brotchy Ledge* which lies one mile and one-tenth southeast by south half south from the Light-house. The danger has five feet of water upon it, and the whole ledge inside the three-fathom line is one hundred and seventy-five yards in diameter with six and seven fathoms of water immediately around that area. This buoy was formerly a bell-buoy.

The geographical position of the Light-house, as determined by the U. S. Coast and Geodetic Survey from the Laurel Point astronomical station of 1867, is:

Latitude	48° 25′ 26″ north.
Longitude	123° 23′ 30″ west.
Or, in time	8h 13m 34s.

Shoal Point Light.—Two fifths of a mile inside the entrance to Victoria Harbor the low, sharp, rocky point on the east side, directly abreast the Light-house on Beren's Island, is named Shoal Point. Around the shoal ground making out to the north-northwest from this point the channel makes a very short turn to the east-southeastward. On this point a *hand-lantern*, showing a *fixed red light*, has been established at an elevation of five feet above the water. It is attached to the framework beacon on the platform buoy which marks the outer end of the spit off Shoal Point. It was first shown August 1, 1889, and will be maintained during the autumn and winter months until further notice. During stormy weather it may become extinguished at times, when it will be impossible to relight it promptly.

Buoy in Victoria Harbor.—The *spar-buoy No. 7*, inside Victoria Harbor, and which marked the Beaver or Spence Rock, two hundred yards east of Songhie's Point, has been permanently discontinued. There is now a depth of nine feet of water on the rock at low water spring tides.

Tides.—The Admiralty chart, 576, gives the following data: It is high water at the full and change of the Moon from May to October between midnight and 1h next morning; and from November to April between noon and 1h in the afternoon. The spring tides rise seven to ten feet, and neaps five to eight feet. With strong southwest and southeast winds the tides rise two feet above ordinary spring tides.

For the details of the approaches to Victoria Harbor, the currents, tides, winds, etc., see the Admiralty chart, 576, and Vancouver Island Pilot. The time and height of every tide during the year can be found from the Tide Tables for the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

The City of Victoria has grown to be a place of much importance by its being the seat of government of British Columbia, from its connection with the Nanaimo coal mines, and being the port for all the steam-boats to Fraser River, the steamers to Port Moody at the terminus of the Canadian Pacific Railroad, the steamers of Puget Sound, and the steam-ships of the coast of California Oregon, and Washington.

TRIAL ISLANDS, OFF VANCOUVER ISLAND.

This group of islands, generally showing as one, consists of two principal, bare, rocky islets lying close under the south shore of Point Gonzales, which forms the extremity of the shore between east of Esquimalt and Victoria Harbors and near the west side of the entrance to the Haro Strait. The shore from Esquimalt and Victoria Harbors to the Trial Islands is irregular, low, and rocky with hillocks of one hundred and forty to two hundred and thirty feet elevation. The general direction is east. The south end of the outer Trial Island is six miles almost exactly east from Fisgard Light-house, three and one-half miles east three-quarters north from Brotchy Ledge buoy, and three and five-sixths miles southwest two thirds south from Discovery Island Light.

The outer and larger islet is a half mile long and stretches out one mile from the shore into fourteen fathoms of water, with a narrow line of kelp along its east and west sides, and deep water on the edge of the kelp. The outer end of the islet is about eighty feet high and is steep-to. The northern or inner islet is low, and foul ground exists close around it, although there is a small row five-fathom channel behind it, called the Enterprise Channel. The currents are strong past the islet, and heavy current rips prevail, especially during the flood, which runs nearly six miles per hour at spring-tides.

DISCOVERY AND CHATHAM ISLANDS, OFF VANCOUVER ISLAND.

These two islands and the adjacent islets are quite close together, and cover an area of one and three-fourths miles northwest and southeast by one mile broad. Chatham is the northwest island, and they are connected by very dangerous ground. The outer or eastern point of Discovery Island is two and a half miles from the nearest point of Vancouver Island. Discovery Island has a very irregular outline; it is longest east and west, and has broken rocky shores guarded by many rocks and foul ground for as much as four hundred yards. The island is a granite mass one hundred and twenty-one feet high and partially covered with firs, through which the rock shows in large patches without a blade of vegetation.

Northwest of Discovery Island, and separated therefrom by a narrow and intricate channel full of rocks, lies Chatham Island (composed of several small islets), somewhat smaller in extent and not so high as Discovery Island, but similar in appearance and formation. Between these two islands and the Vancouver shore lies an extensive area, called Gonzales Sound, nearly filled with rocks and reefs, the main body being called the Chain Islands, which are about thirty feet high. Close around the western side of Discovery and Chatham and east of the Chain Islands is a channel known as the Plumper Passage, from seven to seventeen fathoms, but it is not used for small craft. From the western part of Chatham Island to Cadborough Point the distance is about three-quarters of a mile. Numerous rocks show close to the point.

For details of the passage through Gonzales Sound and around the islands, see the Vancouver Island Pilot.

LIGHT-HOUSE ON DISCOVERY ISLAND.

The structure is placed on the eastern extremity of the island just behind Sea Bird* Point. The building is of wood painted white, and consists of a square tower surmounted by a circular lantern; the height from the ground to the vane is forty-seven feet. The keeper's dwelling is attached to the tower.

The illuminating apparatus is dioptric of the fifth order, and was first exhibited on the 1st of April, 1886, and shows a *fixed white light* every night from sunset to sunrise. The arc of visibility extends through two hundred and fifty-three degrees (253°) from north forty-two degrees west (N. 42° W.) round by the north, east, and south to south thirty-one degrees west (S. 31° W.) so that it shows through the Haro Strait, Sidney Channel, and in the direction of Race Rocks.

* Named after the steamer *Sea Bird*, which was burnt at this place September 7, 1858, during the Fraser excitement.

The focal plane of the light is ninety-one feet above the high-water level, and under favorable conditions of the weather should be seen from a distance of fifteen miles. Towards the southwestward the light is seen outside the Trial Islands.

The geographical position of the Light-house is:

Latitude	48°	25′	20″ north.
Longitude	123	13′	50″ west.
Or, in time	8h	12m	55s.3.

The magnetic variation in January, 1886, was 22° 38′ east, and was then at its extreme limit.

From Discovery Island Light house we have the following bearings and distances to important objects:

Race Rocks Light-house	S. 36½	W.	14¼ miles.
Ediz Hook Light-house	S. 3	E.	18¼ miles.
New Dungeness Light-house	S. 43	E.	15¾ miles.
Point Wilson Light-house	S. 74	E.	25 miles.
Admiralty Head Light-house	S. 80	E.	27 miles.
Partridge Bank Black Buoy	S. 83	E.	18¼ miles.
Hein Bank (three and one-half fathoms)	S. 86°	E.	8½ miles.
Smith's Island Light-house	N. 87°	E.	16¼ miles.
Davidson Rock (Rosario Strait)	N. 66°	E.	16¼ miles.
South Point of Salmon Bank (entrance to San Juan channel)	N. 62°	E.	9¾ miles.
Kelp Reefs in Haro Strait	N. 28°	W.	7½ miles.

The Dominion of Canada proposes to place a fog-signal at the Light-house on Discovery Island.

Tides.—The high water at the full and change of the Moon is irregular and much influenced by prevailing winds; the greatest rise and fall of the tide at Discovery Island is twelve feet. During summer months in the channels the flood stream commences at fifteen minutes past eleven a. m., running with great strength till nearly three p. m., after which but little tide is felt until four a. m. on the following day, when the ebb commences and runs till nearly eleven a. m., the time of low water by the shore. (Richards.)

The island was named by Kellett after Vancouver's two ships.

SMITH'S ISLAND, STRAIT OF FUCA.

The only island lying broadly in the Strait of Fuca is Smith's Island, near the eastern termination of the strait, within six miles of Whidbey Island, and seven miles broad off the southern entrance to the Rosairo Strait. It is quite small, not occupying half a square mile, and rises regularly from the eastern to the western extremity, where it attains a height of about fifty-five feet, with an almost perpendicular cliff of clay and gravel. When approached from Point Wilson and seen in the morning sun, the island shows a bright, low cliff with a black line on top, and running down to the low point at the east. The Light-house and buildings show white. It formerly sustained a few dreary looking trees, but none of great thickness or height, and the surface is covered with a growth of bushes ten or twelve feet high. There is no fresh water to be found on the island, and two or three feet below the surface there is a stratum of hard, dry glacial clay with pebbles.

A very small, low islet called Minor,* exists one mile northeast of Smith's Island, and at very low tides it is connected with it by a narrow ridge of bowlders and rocks. A field of kelp extends to the westward of Smith's Island for one and a half miles, and has a width of a mile. In sailing through this field we found the depth of water uniform at six and a half fathoms, and in no place did we get less; but in 1870 the *Fauntleroy* found a *sunken rock*, bare at the lowest tides. It is three eighths of a mile south fifty eight degrees west (S. 58° W.) from the Light-house, and in a fog a large lumberman was seen going between it and the island. The bottom is hard and sandy. Another, smaller, field is seen to the westward of the one just mentioned. Good anchorage is found on the north side of the island, east of the kelp, in from ten to five fathoms; and on the south side of the island east of the kelp, in from ten to eight fathoms of water, hard bottom. We parted our cable here in a southeast gale, but the smooth sandy bottom enabled us afterwards to secure the anchor. Off the eastern end of the small islet very deep water is found close to the shore.

* Named by the U. S. Coast Survey in 1854.

THE LIGHT-HOUSE ON SMITH'S ISLAND.

This structure consists of a keeper's dwelling, with a short round tower rising through the western half of the roof, and surmounted by an iron lantern painted black. Its height is forty one and a half feet above the surface of the ground. The dwelling and tower are of brick and are plastered and whitewashed, and situated on the highest part of the island near the southwest point. All the trees have been cut down to afford a clear horizon in every direction. The illuminating apparatus is of the fourth order of the system of Fresnel, and shows a *white flash every half minute*. The brightest part of the flash lasts five seconds. When a vessel is close to it the light is not lost, but varies from extreme brilliancy to a faint light.

The focal plane of the lens is ninety-one feet above the mean level of the sea, and under favorable conditions of the atmosphere the light should be seen from a height of—

10 feet at a distance of 14.5 miles.
20 feet at a distance of 16.0 miles.
30 feet at a distance of 17.1 miles.

It was first exhibited on the 18th of October, 1858, and shows from sunset to sunrise.

The geographical position of the light, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	48° 19′ 06″.8 north.
Longitude	122° 50′ 35″.7 west.
Or, in time	8h 11m 22s.4.

In January, 1886, the magnetic variation was 22° 42′ east, and was at its maximum range.

The light shows into the entrances of Canal de Haro, Rosario Strait, and Admiralty Inlet, and out into the Strait of Juan de Fuca.

BEACON NEAR SMITH'S ISLAND.

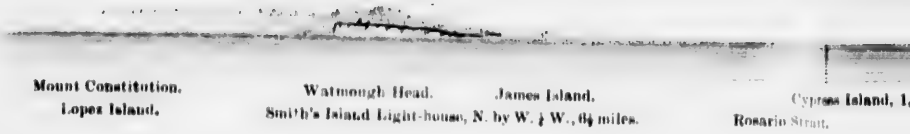
At the extremity of Minor Islet, already described, there has been erected a beacon. It is a *white tripod* thirty-five feet high, with boards on the upper half, making it appear as an elevated pyramid. It is placed on the eastern end of Minor Islet near high-water mark, and bears northeast one and one-eighth miles from Smith's Island Light. Outside of this beacon the depth of water increases very suddenly to ten fathoms to the eastward, but not so sharply to the northward.

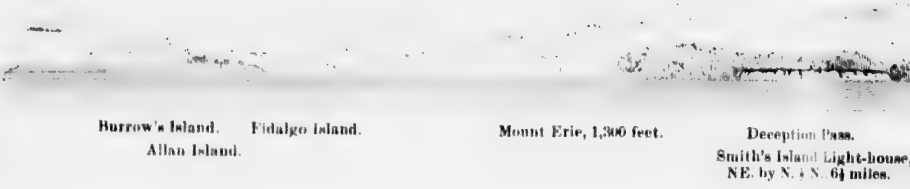
From Smith's Island Light-house we have the following bearings and distances to important objects:

New Dungeness Light-house	S. 26½	W.	18½ miles.
Ediz Hook Light-house	S. 39	W.	24½ miles.
Race Rocks Light-house	S. 65	W.	27½ miles.
Esquimalt Light-house (not intervisible)	S. 80	W.	24 miles.
Trial Islands	S. 79	W.	18¼ miles.
Hein Bank, three and one-half fathom spot	S. 78	W.	8 miles.
Discovery Island Light-house	S. 87	W.	16½ miles.
Tail of the Salmon Bank, entrance San Juan Channel	N. 65	W.	8½ miles.
Davidson Rock, west side Rosario Strait	N. 12	W.	6 miles.
Lawson Ledge, east side Rosario Strait	N. 20	E.	7¼ miles.
Partridge Bank Black Buoy	S. 29	E.	3¾ miles.
Partridge Point Red Buoy	S. 49	E.	6 miles.
Wilson Point Light-house	S. 45	E.	11 miles.

Admiralty Head Light is not intervisible.

The island was discovered by Eliza in 1791 and named Isla de Bonilla. Vancouver gave it no name, 1792. This island was named Blunt's Island by the United States Exploring Expedition in 1841. On the English Admiralty chart of 1847 it was called Smith's Island. It is now generally known by the latter name.


Mount Constitution.
Lopez Island.
Watmough Head.
James Island.
Smith's Island Light-house, N. by W. ¼ W., 6¼ miles.
Cypress Island, 1,
Rosario Strait.


Burrow's Island.
Fidalgo Island.
Allan Island.
Mount Erie, 1,306 feet.
Deception Pass.
Smith's Island Light-house,
NE. by N. ¼ N., 6¼ miles.

Mount Constitution.
Lopez Island.
Blakely Island, 1,044 feet.
Lummi Island, 1,560 fe

Cypress Island, 1,530 feet.
Rosario Strait.

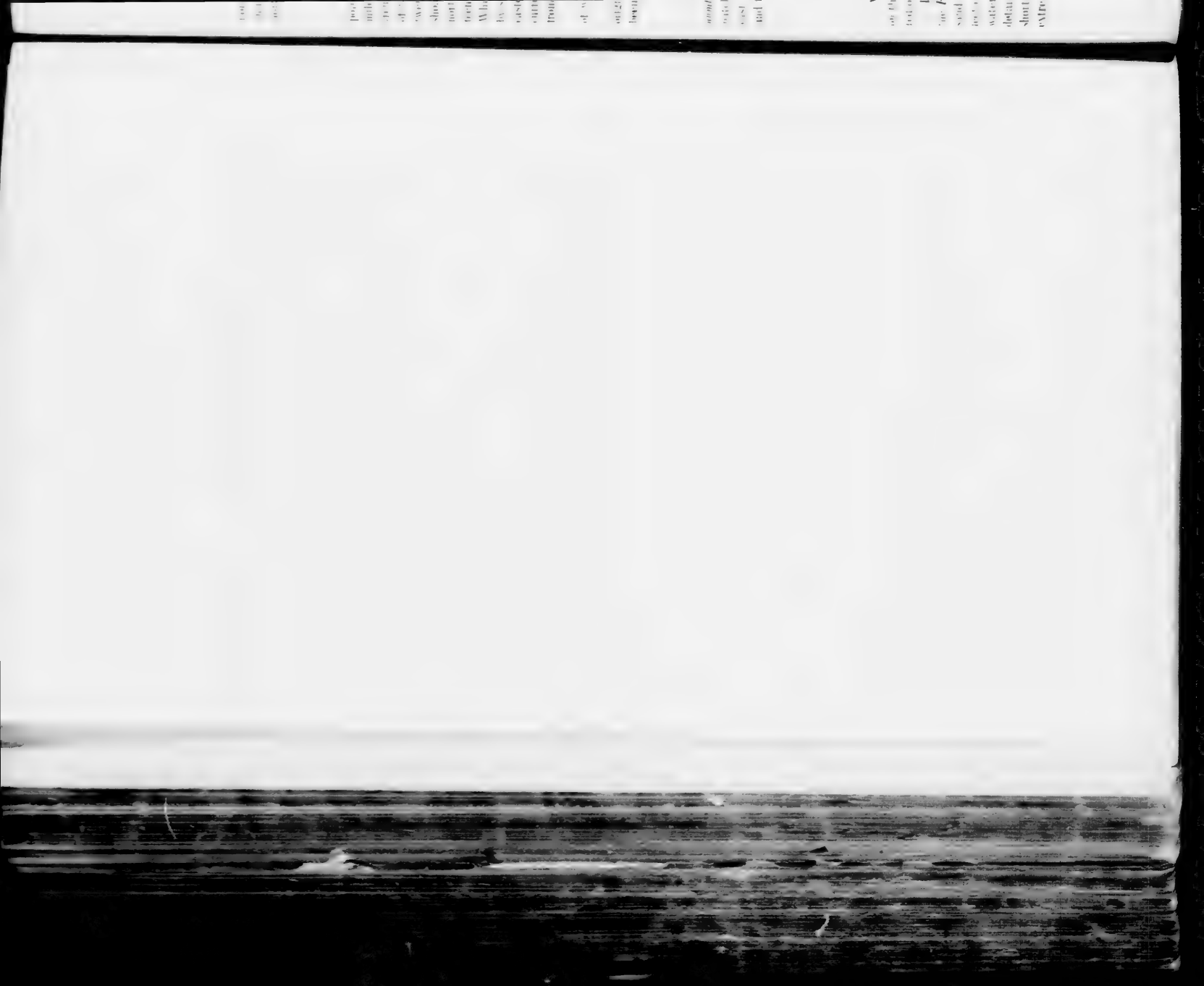
Burrow's Island.
Allan Island.

Fidalgo Island.

Deception Pass.
Smith's Island Light-house,
NE. by N. ¼ N., 6¼ miles.

Whidbey Island.

44 feet. Lummi Island, 1,560 feet. Cypress Island, 1,530 feet. Watmough Head, Southwest Island. Rosario Strait.



BANKS AND FIELDS OF KELP IN THE STRAIT OF FUCA.

THE HASSLER BANK.

Eight and a half miles north sixty degrees west (N. 60° W.) from New Dungeness Light-house, on the line and nearly midway to Victoria, where the former charts gave depths from six to forty-four fathoms, there has been developed a twenty-fathom bank two miles long east and south, and half a mile wide, with as little as fifteen fathoms of water over it.

PARTRIDGE BANK.

Three miles south three-quarters west from Smith's Island Light-house is the northwestern point of this bank within the limits of ten fathoms of water. Inside that depth the bank is three miles long west by north and east by south, one and a half miles in width, and the eastern extremity reaches within one and a half miles of Partridge Point. It is nearly on the prolongation of the shore line from Admiralty Head to the point. The north and east sides fall off sharply to twenty and thirty fathoms. The bottom is generally sand, gravel, and bowlders, except near the shoalest spot, where it is rocky and thickly covered with kelp. This dangerous rock lies on the northern side of the bank midway between the east and west ends. It has a depth of only fourteen feet at the lowest water, and is distant three and a quarter miles from the nearest shore of Whidbey Island. A considerable part of the bank is covered with kelp, which is much underrun by strong currents. The kelp generally extends to the seven-fathom curve, except towards the eastern end, where the shoal narrows and no kelp exists beyond a depth of four fathoms. The currents over the bank are irregular, except under the eastern extremity, where they set strongly from the north and northwest at flood and ebb tides.

There are current rips on all the banks in the Strait of Fuca which split the moving volumes of water; and these rips are heavier in westerly winds.

It is reported that a rock has been seen at the lowest spring tides on this bank; but the original survey was made at the lowest spring tides and no danger seen, and this report has not been verified.

BUOY ON THE PARTRIDGE BANK.

To mark the dangerous rocky spot on this bank a *first-class can buoy, painted black and numbered* **1**, has been placed in twenty-four feet of water at the southeast point of the thickest patch of kelp and distant sixty-six yards south twenty-five degrees and twenty-three minutes east (S. 25° 23′ E.) from the fourteen-feet rock and on the line through Smith's Island Light-house and the rock. The following bearings and distances are given to locate the buoy:

Smith's Island Light-house	N.	25°	23′ W.	3.7 miles.
Point Partridge Red Buoy in five fathoms	S.	77	E.	2.7 miles.
Admiralty Head Light house	S.	72	E.	8.8 miles.
Point Wilson Light house	S.	49	E.	7.5 miles.
The Middle of Protection Island	S.	2°	41′ W.	8.2 miles.
New Dungeness Light-house	S.	42	W.	11.7 miles.

Vessels bound from the western part of the strait into Admiralty Inlet must leave this buoy on the port hand. Vessels passing this black buoy will find the next buoy off Partridge Point a red one, which they must leave on the port hand if bound into Admiralty Inlet.

In former editions we noted the fact that five fathoms of water had been found upon the bank; the *Fauntleroy* had passed over it and found four and three-fourths fathoms over a clear white sand plainly visible. In June, 1871, the ship *James R. Keeler*, loaded with nine hundred thousand feet of lumber for San Francisco, struck upon the bank in twenty-three feet of water at the lowest water, remained fast for half an hour, and came off leaking badly. The shoal was sounded out in detail in August, 1871, and the fourteen-feet rock discovered. During the survey a very ugly, short cross-sea was kicked up in strong winds, and the best anchorage was found under the eastern extremity of the bank.

THE HEIN BANK, STRAIT OF FUCA.

Bearing west half south from Smith's Island Light-house, and eight miles dista[illegible] other field of kelp, nearly a mile in extent. We came unexpectedly upon it at night, [illegible] ing a heavy blow with rain. It was not then marked on any chart. Next morning w[illegible] through it and found the depth of water very uniform at five fathoms, with hard sandy [illegible]

Recent partial examinations show that this field marks the northern part of the [illegible] nearly north and south, with a length of four and a half miles and a breadth of one [illegible] miles within the limits of the twenty-fathom line, and that the least water found amon[illegible] near the eastern edge of the field is three and a half fathoms, where Smith's Island L[illegible] bears north eighty-two degrees east (N. 82° E.), distant eight miles, and New Dungen[illegible] house about south fourteen degrees east (S. 14° E.), distant ten and a half miles. [illegible] should be avoided. There may be dangerous pointed rocks in the thick kelp.

We named this bank in 1854.

In the English Admiralty chart, No. 1917, published in 1865, it is called the Fonte[illegible]

The field laid down as doubtful on the Admiralty chart of 1847, nearly west three [illegible] north, four miles from Smith's Island, and having only two fathoms marked upon it, [illegible] sought for by the U. S. Coast Survey but not found; it is not laid down on the British Ad[illegible] chart No. 1911, with corrections to 1865, nor referred to in the Vancouver Island Pilot.

TWELVE FATHOM BANK, STRAIT OF FUCA.

Five miles southwest half west from Smith's Island Light-house lies the northern [illegible] bank, upon which eleven and one-half fathoms of water has been found, over a botto[illegible] gray sand and broken shells. There is no kelp. The extent of the bank within the twenty-[illegible] curve is three miles long, lying north-northwest and south southeast, and one and a [illegible] broad.

LAWSON REEF.

This is described at the entrance to Rosario Strait.

DALLAS BANK.

This has been described under the head of Protection Island.

SALMON BANK, WASHINGTON SOUND.

One and a half miles directly south of the southeastern point of San Juan Island [illegible] southern entrance to the San Juan Channel, and eight and a half miles north sixty fou[illegible] degrees west from Smith's Island Light house, is the tail of a small field of kelp about half a m[illegible] that has as little as two fathoms of water among it. But we have been informed th[illegible] Hudson Bay Company's steamer *Otter* found as little as six feet of water within its limits.

The bank within the three-fathom curve is one mile long north by west and south[illegible] and nearly half a mile wide. The bank extends one mile farther to the south by east to [illegible] of the ten-fathom line. There is no buoy to mark this danger. A buoy would be of grea[illegible] on the tail of this bank. The current sets by this shoal into the middle channel with a v[illegible] three to six knots.

Between the northern three-fathom line and Cattle Point, on San Juan Island, there [illegible] row passage carrying four and a half fathoms of water. This channel is not recommen[illegible] more especially as the latest chart locates a two-fathom rock two-thirds of a mile off [illegible] one and two-thirds miles southwest by west from Cattle Point. This danger is placed as [illegible] point outside the twenty-fathom line, with thirty fathoms between it and the Salmon Ba[illegible]

CATTLE POINT NEW LIGHT.

On Cattle Point, the southeast point of San Juan Island, a *fixed white light* has been placed upon a white post. It is fifteen feet high, and is about one hundred feet above high water.

The light was established October 1, 1888.

MIDDLE BANKS, STRAIT OF FUCA.

Five and one-third miles north sixty-five degrees east (N. 65° E.) from Discovery Island Light-house is the northwestern limit of this bank, and the only place where ten fathoms of water has been found. The general direction of the bank inside the fifteen-fathom line is northwest and southeast, and the area within the twenty-fathom curve is four square miles. It lies broad off the entrance to the Canal de Haro, and its northeast side falls off from twenty to one hundred and five fathoms in seven-eighths of a mile. There is seventy five fathoms of water between it and the Hein Bank, and to the south southwest it slopes away gradually. To the west there is a depth of forty five fathoms towards Discovery Island Light-house. The bottom of this bank is gray sand and broken shells, and there is no kelp on it.

From the ten fathom spot on the bank Mount Dallas, one thousand and eighty-six feet high, on San Juan Island, bears northwest two-thirds west (NW. ⅔ W.), distant six and one-half miles.

CONSTANCE BANK, STRAIT OF FUCA.

This bank lies in the approaches to Esquimalt and Victoria Harbors, and has as little as nine fathoms of water upon it in one spot, which lies southeast by east three quarters east (SE. by E. ¾ E.) five and three-fourths miles from Esquimalt Light house, and southeast one-third east (SE. ⅓ E.) four and a quarter miles from Victoria Light-house. It is in the range of the red light showing from Esquimalt Light-house. The general direction of the bank inside the twenty-fathom line is north by east (N. by E.) and south by west (S. by W.) for two miles, and the width nearly one and a half miles. There are some soundings of eleven fathoms upon it over a bottom of gravel and broken shells. On the northwest side the bank drops off to fifty fathoms of water, and a deep channel carrying sixty fathoms of water lies between it and the shore near Victoria Harbor and the Trial Islands. The currents run through here from three to six knots an hour. Outside of the bank, two miles to the southeast, the currents run from two to four knots an hour.

A *fields and patches of kelp* in these waters should be avoided, as they denote foul, rocky bottom, and in many of them isolated and dangerous points of rock have been found, sometimes even after a very scrutinizing survey.

WASHINGTON SOUND.

Between the southeast part of Vancouver Island and the mainland through ten to fifteen miles of latitude lies an extensive group of high mountainous islands cut up by numerous passages and channels. On the south the islands form the northern limit of the eastern part of the Strait of Fuca; and on the north they form the southern limit of the Gulf of Georgia. The principal channels through the archipelago from south to north are the Rosario Strait on the east, the Canal de Haro on the west, and the San Juan or Middle channel between San Juan and Lopez Islands.

The high mountains and the channels and passes afford numerous landmarks and ranges to vessels navigating these waters.

The currents pass through all the passages with great velocity, and the depth of water is everywhere very great.

REID ROCK, SAN JUAN CHANNEL.

This danger lies nearly in mid-channel between the southwestern shore of Shaw Island and the point of San Juan Island at the north side of Friday harbor. It has two fathoms of water over it, and has been marked by a *can-buoy* having *horizontal red and black stripes*. It lies one and three-eighths miles west by north one quarter north (W. by N. ¼ N.) from Turn Rock Spindle.

SAN JUAN CHANNEL, TURN ROCK.

On the western side of the channel and five miles northwest by north from the southern entrance the *Turn Rock*, which bares at the lowest tides, has been marked with an *Iron Spindle* having a *white* painted *barrel* on top. It lies one and three-eighths miles east by south one-quarter south (E. by S. ¼ S.) from Reid Rock buoy. This rock lies about one-third of a mile eastwardly from the north point of Turn Island. There is deep water around it, and from thirty to sixty fath-

oms in mid-channel. It is directly opposite the southern entrance to Upright Channel, between Lopez and Shaw Islands, and at the point in the San Juan Channel where it changes its direction to the west-northwest.

Griffin Bay.—A *spar-buoy*, painted with *black and red horizontal stripes*, has been moored in the approach to North Bay, which is northern part of Griffin Bay. The buoy lies three fifths of a mile east of north (E. by N.) from the north end of Dinner Island. It marks a *danger* not shown on any chart, and which would appear to be the tail of a six-fathom ledge making out half a mile to the southward from the north shore, which is rocky. There is a depth of seventeen fathoms inside this ledge and eleven fathoms close outside. The shoal spot has only three feet of water upon it at low tides, and is well indicated by a patch of kelp about a quarter of a mile in extent.

That part of the Strait of Fuca east of Race Rocks to Whidbey Island and all of Washington Sound form part of the "Gulf of Georgia" of Vancouver's general chart, and on his extended chart the "Gulph of Georgia."

Washington Sound has also been called the Archipelago de Haro from the discovery of Lopez Gonzales de Haro in 1789, and of Quimper in 1790. It was first explored by Don Francisco de Eliza in 1791.

Vancouver, in 1792, passed through the Rosario Strait from the south, and gives a good representation of the channel and islands, his boats evidently working among them. Galiano and Valdez, in 1792, about a month later than Vancouver, passed through one of the straits from the north, and represented the mass of islands as one which they designated Isla de San Juan. The agents and factors of the Hudson Bay Company doubtless knew most of the channels and islands subsequently; still, up to 1853, they exhibited only eye-sketches of the Canal de Haro north and east of Sidney Island. In 1841 the United States Exploring Expedition made the reconnaissance of the archipelago, but did not lay down the islands on the western side of the Canal de Haro. The Rosario Strait was then surveyed, and called Ringgold's Channel Pass. Most of the islands, channels, points, etc., were named after officers and vessels of the navy, and it is said to have been intended to call the whole group the Navy Archipelago. The Canal de Haro is erroneously called the Canal de Arro by Vancouver.

The Canal de Haro and Rosario Strait were surveyed by the U. S. Coast Survey in 1853 and 1854, when the name Washington Sound was applied to the whole archipelago between the mainland and Vancouver Island.

THE CANAL DE HARO.

The southern entrance may be said to lie between Discovery Island on the west and the southeast point of San Juan Island lying ten and a half miles northeast by east therefrom. Between Discovery and Chatham Islands and the nearest shore of San Juan Island to the northeast the breadth of the canal is only five and one-half miles. Looking northwestward from this entrance there is apparently no passage through, because the large islands to the northeast and north northwest overlap and appear to form a comparatively low barrier. Nevertheless there is one principal channel and several smaller but available channels through to the broad waters of the Gulf of Georgia. From a point in the canal two miles east-northeast from Discovery Island Light a course can be laid which will carry a vessel through more than one-half the channel, but a sudden and sharp change to the northeast will, with a slight change, take a vessel through to the gulf.

The first course is north thirty-seven degrees west (N. 37° W.) for sixteen and one half miles, to between Stuart and Moresby Islands; then northeast for seven miles; last north-northeast four miles, to midway between Patos Island and Saturna Island. *A vessel must pass over these waters with the latest charts or a good pilot.*

Commencing at the starting point we have *San Juan Island** on the eastward, and passing the distance of one and a half miles. The current rips are sometimes quite dangerous. The mountains of San Juan rise to one thousand and eighty-six feet, and some of them are only partly covered with wood. The bluffs are very precipitous and inaccessible, and the depth of water close to them is as much as one hundred and fifty fathoms.

* Named San Juan on English Admiralty charts of 1847 and 1859; Bellevue by the Hudson Bay Company; Bellevue by the United States Exploring Expedition, 1841.

Mount Sullivan, 2,330 feet.

Sidney Island.

Discovery Island Light-house, NW. by W., 10 miles.

James Island.

Canal de Haro.

Cedar Hill, or Mount Douglas, 690 feet.

Discovery Island, NW. ½ N., 6¼ miles.

Sidney Island.

Canal de Haro.

Washington Territory.

Race Rocks Light-house, N. by

ıd.

Canal de Haro.

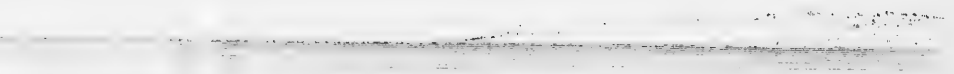
Henry Island.

San Juan Island.
Mount Dallas, 1,086 feet.

Sidney Island.
Canal de Haro.

Stuart Island. Henry Island.

San Juan Island.



Race Rocks Light-house, N. by E. ¼ E., 1¼ miles.

Mount Miles.

Vancouver Island.

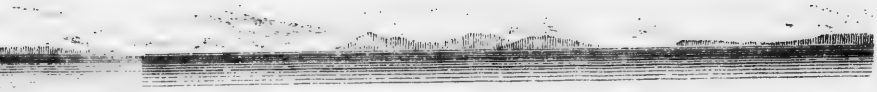
Discovery Island Light-house,
NW. ¼ N., 6 miles.

Canal de Haro.

Cloud and haze; highlands not visi

Mount Constitution, 2,428 feet. N. ¼ E., 26 miles.

Nob of Orcas, 1,104 feet.
Landmark for Middle Channel Passage,



Canal de Haro.

oud and haze; highlands not visible.

Knol

Knob at Orcas, 1,104 feet.

North Entrance, Canal de Haro.

Waldron Island, 8 miles.

Skipjack Island, 7 miles

Patos Island

Matia Island, N. ¼ E., 1¼ miles.

aro.

k Island, 7 miles

Saturna Island.
East Point Light-house,
S. by E., 4 miles.

Turtle Back, 1,600 feet.

miles.

Matia East.

Bare Island, S. ¼ W., 3¾ miles.

Canal de Haro, North Entrance from SW.

Patos.

Waldron Island.

West Point, 6¼

Knob of Orcas 1,104 feet,
S. by E. ½ E., 8 miles.

Orcas Island.

Canal de Haro, North Entrance

Douglas Channel.

Point Doughty, SE. by S., 4¾ miles.

Turtle Back Range, 1,600 feet. Orcas I

Entrance from SW. Patos.

Skipjack Island, S. by W. ¾ W., 4 miles.

West Point, 6¼ miles.

de Haro, North Entrance.

Douglas Channel.

Waldron Island.

le Back Range, 1,600 feet. Orcas Island.

To the westward are Douglas and Chatham Islands and the main shore of Vancouver Island marked by a rather low, rough, rocky shore-line, with numerous round-topped hills and mountains of moderate elevation. The greater extent of the strait or canal is to the westward of the course given, stretching off into bays and passages among the islands.

CORMORANT BAY,* VANCOUVER ISLAND.

Cormorant Bay is the only available anchorage about this entrance. It commences at Gordon Head five miles north sixty-three degrees west (N. 63° W.) from Discovery Island Light-house; then stretches westward for two miles, and gradually curves to the north-northwest, with a long high cliff, broken and bright at *Cowitchin Head*,† four and one-half miles north fifty-six degrees west (N. 56° W.) from Gordon Head. Half a mile back of the southwest part of the bay rises a bold rocky-topped hill, named Mount Douglas,‡ which reaches a height of six hundred and ninety feet. There is anchorage in eight to ten fathoms. Fresh water is obtainable on the southern shores of the bay. The northern limit of the bay is *Darcy Island*,† north one-quarter west four miles from Gordon Head, and on this course, and one and three-quarters miles from the head, is *Zero Rock*,† a small white rock showing a few feet above water, with plenty of water around it, but foul bottom and a patch of kelp a few hundred yards north-northwest of it.

ZERO ROCK BEACON.

A *Wooden Beacon* has been erected on Zero Rock near its middle. The rock is awash at high water. The *Beacon is pyramidal*, thirty feet in height, surmounted by a pole and frame in the shape of an obelisk twenty feet high, making the whole structure fifty feet above the water. The whole is whitewashed.

At one mile and at a mile and a quarter west of Zero Rock are two *sunken* rocks. In the bay a depth of not over twenty fathoms is found, decreasing irregularly in advancing, but in the southern portion affording capital holding in ten fathoms. A mile and a half east-southeast from Gordon Head are patches of kelp and foul bottom.

For details of this western side see the Vancouver Island Pilot.

When eight and a half miles within the entrance of the Canal de Haro the width of the strait decreases to three and a quarter miles, having Darcy Island (low and wooded) on the west, with a small islet off its northeast face, and very large fields of kelp stretching far off the southeast point into the canal. In one of these fields we discovered in 1854 a sharp-pointed rock, which has been named *Unit Rock*.§ It lies east by south five-eighths south (E. by S. ⅝ S.) from the southeast point of Darcy Island and distant from it three-quarters of a mile. The small sharp apex of this rock rises about three feet above the very lowest tides. In recent charts deep water is placed around it, and when the Coast Survey brig *Fauntleroy* beat through the field the existence of this danger was unknown.

KELP REEF, CANAL DE HARO.

Since the discovery of Unit Rock several sunken rocks have been discovered farther out towards the middle of the strait. There is a space of nearly one square mile, with four *dangers* marked by kelp. The southeastern one uncovers at the lowest spring-tides; it is seven and one-fourth miles north thirty degrees west (N. 30° W.) from Discovery Island Light-house, and only two and two-thirds miles from San Juan Island. The next one to the northward has two fathoms of water upon it and lies nearly half a mile north of the former, or seven and a half miles north twenty-eight degrees west (N. 28° W.) from Discovery Island Light house. In the mid channel of the strait between this kelp reef and San Juan Island, the depth of water is one hundred and forty fathoms and the currents run from three to six miles per hour.

The island to the eastward, nearly abreast of Darcy, with a small cove at its southern end, is *Henry Island*,‖ having a high, rocky, precipitous front, and a swirling current around it. It lies on the northwest part of San Juan Island, and the *Mosquito Channel*, carrying three fathoms of

* On the English Admiralty chart, 1847, it is called Cordova Bay. On that of 1859 it is called Cormorant Bay.
† From the name of the Indian tribe in this vicinity. Admiralty chart, 1847.
‡ Admiralty chart, 1847.
§ Named by the U. S. Coast Survey in 1854.
‖ Named by the United States Exploring Expedition, 1841.

water, runs between them. Farther on, and to the westward, is the southeast end of *Sidney Island*,* one and a half miles northward of Darcy, with the *Dot Rocks* between them, but near Sidney. This island is not high like those on the eastern side of the channel, and a landing is easily made at any point of its shore. The canal here, ten miles from the entrance, is two and three-quarter miles wide. To the eastward it opens beyond the north end of Henry Island, with high mountainous islands bounding the view. To the westward lie a couple of long, narrow islands, a mile northward from Sidney, and parallel thereto, and between them and the latter is good anchorage and capital fishing ground for halibut. The island near the canal is named Halibut Island.† The moderately low, wooded islands, three or four miles ahead, and on the western side of the channel are named on the latest charts. Between them runs the inside channel for steamers to the Nanaimo coal mines. The background of the view is occupied by wooded islands, overlapping each other and appearing like a continuous shore. The large high island on the eastern side, fifteen miles from the entrance, is *Stuart Island*,‡ and the canal is here contracted to a breadth of only two miles, this being the narrowest part, with Moresby Island lying directly west from Stuart Island. Two and one-eighth miles west-southwest from the western point of Stuart Island, the British surveying steamer *Plumper* found (1858) a *rock* covered at a quarter flood, and having irregular bottom around it for the space of half a mile square, with soundings from five to twenty fathoms. It is known as *Arachne Reef*, and lies nearly midway between Moresby Island and the island to the southeast. It is west of the line joining the eastern points of the island. Between this reef and Stuart Island, but near the latter, there is a depth of one hundred and seventy-eight fathoms. One mile northwest of Stuart Island a depth of one hundred and ninety fathoms is found. There are very strong and heavy current rips in this part of the canal.

Stuart Island in many places is very high and precipitous, and covered with timber, but in some parts sparsely. Near its southwest head a perpendicular wall of rock serves also to distinguish it. After passing the western end of this island at the distance of a mile, the channel takes an abrupt turn to the eastward, and the Gulf of Georgia is seen with Patos and Saturna Islands in the foreground. The course now is northeast for seven miles, having on the northwest side Pender and Saturna Islands, which rise into mountains of one thousand and four hundred feet elevation. *Java Head*,§ near the eastern extremity of Saturna Island, stands up vertically nearly seven hundred feet, but the extreme part, called East Point,‡ is a long, sloping point, in many places destitute of trees. The small island lying off its north shore is Tumbo.‡

When Java Head bears northwest one-quarter west distant one and two-thirds miles, the east point of Saturna Island bears north quarter east distant three miles, and Skipjack Islets bears east half north distant one and seven-eighths miles, the course is changed to north-northeast for four miles, which brings a vessel between the east point of Saturna and the west point of Patos Island.

On the starboard hand the waters open well to the southeast, and the islands rise in high hills and mountains. The large island abreast of Java Head is *Wardron*,‡ which has good anchorage off its southwest side, where the shore-line curves well in. The western point is low and sandy; the southern, called *Point Disney*,‡ is perpendicular, high, and rocky. Off its northeast face lie two islets, called the *Skipjack Islands*.‖ The western one is about one mile from Wardron, moderately high, and wooded; the eastern one, named Bare Island,¶ is the smaller, and is one hundred forty feet high, destitute of trees, but covered with grass; it lies a mile east of the former. Between these islands lies a *sunken rock*, and the current rushes by with great velocity.

On the charts of the United States Exploring Expedition, 1841, two islands, called Adolphus and George, are laid down close to the Skipjacks, but in 1853 we examined the vicinity and discovered that they did not exist.

When East Point bears northwest by west three-quarters west (NW by W. ¾ W.) two miles

* The name on the English Admiralty chart, 1847.

† Named by the U. S. Coast Survey in 1854. On the Admiralty chart, 2689, called Low Island.

‡ Named by the United States Exploring Expedition, 1841.

§ Named by the United States Exploring Expedition in 1841. On the English Admiralty chart of 1858 it is called Monarch Head.

‖ So called by the United States Exploring Expedition in 1841. Named Wooded Island and Bare Island by U. S. Coast Survey in 1853.

¶ Named by the U. S. Coast Survey in 1853. On Admiralty chart, 2689, called Penguin Island.

Orcas Island.

Tu

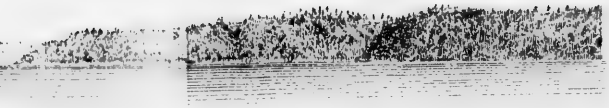
Saturna Island.
East Point Light-house, SE. by S., 5 miles.

North Entrance, Canal de Haro.
Tumbo Islands.

North Entrance Canal de Haro.
Saturna Island.

Turtle Back Range, 1,600 feet, 8¼ miles.

Point Hammond,
SE. ¼ S., 5 miles.



Boat pass. Samuel Island.

Saturna Island. Canal de Haro, North Entrance.
East Point Light house, SW. by W. ½ W., 13 miles.
Tumbo Channel,

Moresby Island, SW., 14 miles. Pender Island, SW. ¼ W., 9 miles. Java Head, 6

Canal de Haro, North Entrance.
Stuart Island.
Turn Point, SW. ½ S., 12 miles

Haro, North Entrance. Tumbo Island.

Tumbo Channel,

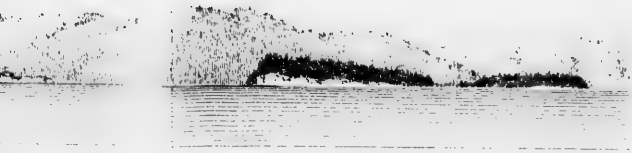
W. ¼ W., 9 miles. Java Head, 680 feet, SW. ¼ W., 5 miles. Saturna Island. East Point, 3 miles.

Turn Point, SW. ¼ S., 12 miles. Moresby Island.

Saturna Island. Canal de Haro, North Entrance.
East Point Light-house,
SW. by W. ½ W., 13 miles.
Tumbo Channel.

Moresby Island, SW., 14 miles. Pender Island, SW. ½ W., 9 miles. Java Head, 68

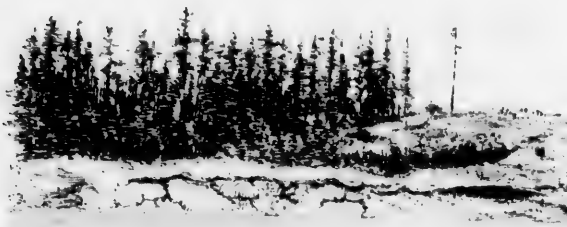
Canal de Haro, North Entrance.
Stuart Island.
Turn Point, SW. ½ S., 12 miles.



Haro, North Entrance. Tumbo Channel. Tumbo Island.

. ¾ W., 9 miles. Java Head, 680 feet, SW. ¾ W., 5 miles. Saturna Island. East Point, 3 miles.

Turn Point, SW. ¾ S., 12 miles. Moresby Island.



Saturna Island. East Poi

Knob of Orcas, 1,104 feet, SE. by S., 38¼ miles. Skipjac

Canal de Haro (North Entrance).

Saturna Island.

East Point Light-house, S. by E., 1¼ miles.

Saturna Island. East Point Light-house (looking north).

Skipjack Island, SSE., 4¼ miles. Reef off East Point, 1 mile.

Haro (North Entrance).

Saturna Island.

e, S. by E., 1¼ miles.

distant, the west end of Patos Island* will bear north northeast two and a half miles, and the west end of Sucia Group† east-northeast three and a half miles; the course out lies north-northwest between Patos and East Point, which are two and three-fourths miles apart. Seven miles on this course carries a vessel to the middle of the Gulf of Georgia. Close off East Point is found a depth of one hundred and twenty fathoms, and off Patos Island one hundred and seventy fathoms. All these islands are moderately high and covered with wood. They are rugged and irregular, composed of sandstone and conglomerate, upheaved until the strata are nearly perpendicular in some places, and interspersed with small veins of lignite.

West's Bank‡ lies southwest by west seven-eighths west (SW. by W. ⅞ W.) one mile from the southwest point of Sucia; it has less than two fathoms of water upon it, and is marked by a large mass of kelp.

The approximate geographical position of two or three points, as determined by the U. S. Coast Survey, will serve to check the courses above given:

Discovery Island Light-house is in—

Latitude	48° 25′ 20″ north.
Longitude	123° 13′ 50″ west.

The Western Point of Stuart Island, at the sharp turn of the canal, is in—

Latitude	48° 41′ 19″.9 north.
Longitude	123° 14′ 08″.8 west.

The West Point of Patos Island is in—

Latitude	48° 47′ 05″.6 north.
Longitude	122° 58′ 09″.8 west.

The East Point of Saturna Island is in—

Latitude	48° 46′ 53″.7 north.
Longitude	123° 02′ 45″.7 west.

From Discovery Island Light-house to *Turn Point*, the western point of Stuart Island, the distance is sixteen miles, and the bearing northwest by north half north (NW. by N. ½ N.), the course passes over the eastern edge of the dangerous Kelp Reef about midway between the two points. From Turn Point to East Point of Saturna Island the distance is nine and two-thirds miles, and the course is northeast by east half east (NE. by E. ½ E.)

LIGHT-HOUSE ON EAST POINT, SATURNA ISLAND, BRITISH COLUMBIA.

A light-house has been established by the Dominion of Canada on the east point of Saturna Island, at the western side of the northern entrance to the Canal de Haro, from the Gulf of Georgia. In the published notices this part of the Canal de Haro is erroneously called the Stuart Channel.§

The exact location is on the western shore of east point, six hundred and thirty-five yards from the extreme northern point. It is on the top of the cliff, which is here eighty-five feet above the water. The land falls away to the west, north, and east.

The main building consists of a square wooden tower sixty feet from the ground to the vane of the lantern, and there is a keeper's dwelling attached to it. The building is painted white, and the iron lantern which surmounts the tower is painted red.

The light was first exhibited on the first of January, 1888, and shows from sunset to sunrise. The illuminating apparatus is catoptric, and shows a *revolving white light*, of which the *flashes* attain their greatest brilliancy every thirty seconds.

The focal plane of the light is one hundred and forty-five feet above high-water mark, and is visible, from a height of fifteen feet, at a distance of eighteen miles.

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* The Spanish name. Patos signifies geese. Called Gourd Island by the United States Exploring Expedition, '41.

† The Spanish name. Sucia signifies muddy. The harbor on the east has a soft muddy bottom. The United States Exploring Expedition called them the Percival Group, 1841. The Indian name is Choo-sá-nung.

‡ Discovered and named by the U. S. Coast Survey, 1858. Called Plumper Reef on English Admiralty chart, 1859.

§ The Stuart Channel of the Admiralty charts and Admiral Richards's "Vancouver Island Pilot," and also of the Coast Survey charts, is that one lying between Admiral Island and the main shore of Vancouver Island, and not reaching to any part of the Canal de Haro.

The arc illuminated extends through 278° 26′, from northwest by west quarter west (NW. ¼ W. ¾ W.) round by the north, east, and south to southwest half south (SW. ½ S.). The latt course clears Java Head at two and three quarters miles from the light, and the former cour passes over the eastern point of Tumbo Island, one mile distant.

The light should not be approached within a mile and a half from the northwestward, so to keep clear of the dangerous ground off the eastern end of Tumbo Island, and also of the nort ern extremity of East Point. (The three-fathom line extends six hundred and twenty yards the northeastward from the prolongation of Tumbo and Saturna Islands, with kelp outside, a rocky, irregular bottom.)

When a vessel is bound northward through the Canal de Haro the light will be visible as soo as she is up with Turn Point, the western extremity of Stuart Island.

The geographical position of this Light-house, as determined by the U. S. Coast and Geodet Survey, is—

Latitude	48°	46′	53″ north
Longitude	123	02′	46 west
Or, in time	8h	12m	11s.1

In January, 1889, the magnetic variation was 22° 51′ east, with an annual decrease of 0°.3

From this Light-house the bearings and distances to important objects are—

Sands Head Light, Fraser River	N. 50°	W.	19¾ miles.
Point Roberts, west	N. 31°	W.	11½ miles.
Point Roberts, east	N. 18°	W.	11¼ miles.
Birch Point, north side Birch Bay	N. 20	E.	13 miles.
Point Whitehorn, south side Birch Bay	N. 33°	E.	12 miles.
Western point Patos Island	N. 60°	E.	3 miles.
Buoy on Alden's Bank	N. 60°	E.	9 miles.
Point Lawrence, Orcas Island, Rosario Strait	S. 82°	E.	14 miles.
Bare Islet, off Point Hammond, President Channel	S. 45°	E.	3¼ miles.
West end Skipjack Islet	S. 27°	E.	3 miles.
Turn Point, west end Stuart Island	S. 30½	W.	9½ miles.
Java Head	S. 37°	W.	2¾ miles.

The *boundary line* between the United States and British Columbia passes from the Gulf Georgia to the Strait of Fuca through the middle of the Canal de Haro, so that all the wate and lands east of that line are within the Territory of Washington.

The number of islands and the intricate channels lying between the Canal de Haro and t Rosario Strait we shall not attempt to describe. A proper appreciation of their sizes a relation and of the channels between them can only be had by consulting the chart. The Co Survey chart No. 684 gives all the known information on the subject.

THE ROSARIO STRAIT.

Rosario Strait is the eastern of the two principal channels running through the Washingt Sound, between Vancouver Island and the mainland. Its southern entrance is sixteen miles e of the southern entrance to the Canal de Haro, and lies north by east seven miles distant fr Smith's Island Light-house. It is four and a quarter miles wide. The western point of t entrance is formed by a point running out from *Watmough Head*,* which is four hundred a fifty feet high, and on the southeast part of Lopez Island.† Off this point lie several rocky isle with deep water among them and rushing currents. The outer one, named Southwest Island is about fifty feet high, rocky, flat-topped, destitute of bush or tree, narrow, and about one thi of a mile in length, east and west. East five-eighths south (E. ⅝ S.) from it, at a distance of h a mile, lies *Davidson Rock*,§ possibly bare at the lowest tides. A patch of kelp exists upon a around this danger, but the kelp is generally run under the surface of the water by the streng of the currents.

* Named Watmough Head by the United States Exploring Expedition in 1841. On the first sheets of the U. S. Coast Survey erroneously called Walmough Head. On the English Admiralty chart of 1859 called Walmouth H on the present chart Watmouth Head. The Indian name is Noo-chaad-kwun.

† Vancouver determined it to be an island in 1792. In 1841 the United States Exploring Expedition named Chauncey's Island. The English Admiralty chart of 1847 has it Lopez Island, and it is always known by this na on the coast.

‡ Named by the U. S. Coast Survey in 1854.

§ Named on the English Admiralty chart of 1859; in 1854 we discovered and named it Entrance Rock.

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Cypress Island, S. ¼ W., 4¼ miles. North Entrance, Rosario Strait Moun

Point Lawrence, S. by E., 4 miles. North Entrance, Rosario Strait. Orcas, Clark, and Barnes islands.

Lummi Mountain, 1,560 feet, SE. by E. ¼ E., 11 miles. Rosario Strait, North Entrance.

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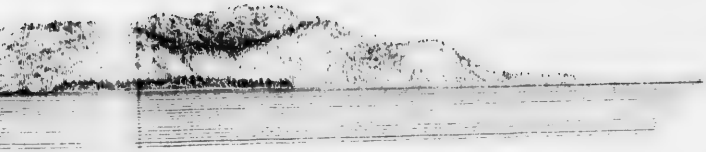
Mount Constitution, 2,423 feet, W. by S. ¼ S., 6¼ miles.



Entrance, Rosario Strait.
Clark, and Barnes Islands.

, North Entrance.

Cypress Island.
Lake Mountain.

The whole southern face of Lopez Island is guarded by rocks and reefs. The island itself is very rocky and moderately low. On part of its southern cliff near Iceberg Point* we discovered in 1854 remarkably deep and smooth marks of glacial action.

The eastern side of the southern entrance to the strait is formed by the northwest point of Whidbey Island, which is not very prominent, and by *Sares Head*, which is the bold rocky face of the southwest part of Fidalgo Island. Beyond and over Sares Head rises Mount Erie, one thousand three hundred feet above the sea.

On the eastern side of the entrance to the strait there is a small wooded island, fifty or sixty feet high, lying in the mouth of Deception Pass. It is not quite half a mile west-northwest from the point of Whidbey Island, and half a mile southwest from the nearest point of Fidalgo Island.

DECEPTION PASS.

At the eastern side of the strait at the entrance there is an intricate and very narrow three-fathom channel, very nearly three miles long, running between the north end of Whidbey Island and the south end of Fidalgo Island,† and masked by Deception Island. It is the Boca de Flon of Eliza, 1791, but it is now known only by the apt designation given above.

Vancouver called it Deception Passage in 1792. Galiano and Valdez called it Boca de Flon, thinking, with Eliza, that it was the strait of that name seen by Quimper in 1790. It was named Deception Pass by the United States Exploring Expedition in 1841, when the brig *Bainbridge* passed through it from the eastward; and it is known by no other on this Coast.

In the middle of the entrance to Rosario Strait Vancouver anchored in thirty-seven fathoms of water over black, muddy bottom.

There are two dangers in the entrance. At the southwest point there is the Davidson Rock, already described, page 560. At the eastern side of the entrance is the *Lawson Reef*.

Deception Pass.—New Light.—"On the southwest point of Fidalgo Island and on the north side of the western entrance to Deception Pass a *fixed white light* has been placed on a white post. This light is a little more than one half a mile west of the narrowest part of the pass." Outside of it lies Deception Island at a distance of two-thirds of a mile.

The post is five feet high, eight feet back from the edge of the rocky cliff, and about forty feet above high water.

From this light the northwest point of Whidbey Island lies south-southwest (SSW.), distant a little over half a mile; and Deception Island southwest by west half west (SW. by W. ½ W.).

The light was established October 1, 1888.

LAWSON REEF.

This is a very dangerous rocky ledge lying one and three-fourths miles directly off the western entrance to Deception Pass and just in the southeast part of the south entrance to Rosario Strait. The general direction of the ledge is north and south, and within the eight-fathom curve it is three-fifths of a mile in length and three-tenths of a mile in breadth. The kelp patch marking it is half a mile long north and south, and lies over the area of the reef, having six fathoms of water and less. It was very dense and tangled at the time of the examination in 1872. The shoalest spot is one hundred and seventy yards in extent, and has three and three-fourths fathoms of water upon it. The bottom is rocky and irregular, and there are several points having no more than three and one quarter fathoms of water upon them. Good water is had all around the kelp field, and depths of five to seven fathoms can be carried to its edges.

The depth of water increases very suddenly away from the reef, but more particularly on the northeast side, where a depth of thirty fathoms is found within two hundred yards of the ten-fathom curve. On the west side the thirty-fathom curve lies a quarter of a mile from the ten-fathom. Within half a mile from the ledge on the east and south sides the depth of the water is fifty fathoms and more.

The following bearings and distances locate the shoalest part of this danger, which is not yet marked by a buoy:

Deception Island	N. 59° E.	1.75 miles.
The west point of Burrows Island, open by the west point of Allan Island	N. 22° W.	4.5 miles.
Smith Island Light-house	S. 23° W.	7.3 miles.
Point Partridge	S. 13° E.	10.5 miles.

*Named by the U. S. Coast Survey in 1854.

†Fidalgo Island was named Isla de Fidalgo by Eliza and Narvaez in 1791. The United States Exploring Expedition called it Perry's Island.

When at the southern entrance to Rosario Strait, and one and a half miles from the weste side, a line passes clear of everything from one end of the strait to the other. This course north by west half west (N. by W. ½ W.), and the distance is nineteen and a half mi north entrance. It passes between Bird and Belle Rocks, and almost tangent to Point on Orcas Island.

The view through the strait is quite striking; on the eastern side are the mode islands, Allan, two hundred and thirty feet, and Burrows, six hundred and forty feet, of them is Mount Erie, one thousand two hundred and fifty feet high, and Sugar Loaf, sand and sixty feet high, both on Fidalgo Island; farther northward is Lake Mountain, sand five hundred and twenty-five feet high, on Cypress Island. On the western side of is Watmough Head, four hundred and fifty feet high, on Lopez Island; a mountain Island, one thousand and forty-four feet high, only three and one quarter miles west from Lake Mountain; and towards the northern entrance Mount Constitution, two thous hundred and nine feet high, on Orcas Island. There is a double lake half way down east flank of this mountain eleven hundred and thirty feet above the strait.

A vessel from Puget Sound bound through the strait will enter the southern entrance mid-channel; and the course to clear Belle Rock, nearly half a mile on the port hand, an midway between Cypress Island and Blakely Island, less than one and a half miles apar thirty degrees west (N. 30° W.) for eleven and two thirds miles until the north end of is open by the south point of Sinclair and Vendovi Islands. Then north half east for l half miles, when Lawrence Point bears west-southwest, distant one and a fourth miles, north point of Sinclair Island bears east-southeast, distant two and a half miles. The final course is northwest five miles, to the Gulf of Georgia.

Vessels bound through the strait round the southeast point of Lopez Island at the dis a mile, and steer a north course until Bird Rock is passed half a mile, and then steer no degrees west (N. 30° W.), passing midway between Blakely and Cypress Islands, as alre tioned. Off Watmough Head vessels will find the currents running from two to six miles p

The shore for the first two miles inside the entrance on the western side is modera declining to a point named Cape St. Mary on the recent Admiralty chart, a quarter of a side of which lies *Kellett's Ledge*,* bare at the lowest tides, and having deep water all a The ledge is marked by a mass of kelp. Thence the shore of Lopez Island makes a deep b a mile to the westward, with a low beach and marsh, over and beyond which *Lopez Sound* seen. This bend is named *Shoal Bight*,† and has from six to ten fathoms of water for a with level, sandy bottom. There is a little patch of kelp near the outer edge, with six fa water in it. The ten fathom curve of this capital anchorage lies outside the line of Mary and the western side of James Island. In mid-channel rise the *Bird Rocks*,§ abo feet high, consisting of three small, rocky islets very close together, and running in direction. They are somewhat pyramidal in form, and during the summer show yello account of the parched grass and the color of the rocks. Abreast of them, on the west is a narrow opening or pass between two low, rocky heads of Lopez and Decatur Islands.‡ of this pass is a line of islets ranging from the north head and making the channel run the south. This barrier is called Lopez Chain,‡ and the entrance the Lopez Pass.§ Seve islands are found inside. Vancouver's boats evidently were in this bay, as his chart giv general idea of it. The anchorage of Shoal Bight continues some distance northward Pass, and abreast of some moderately high white cliffs on the southeast face of Blakely I

BELLE ROCK.

North-northeast three quarters of a mile from Bird Rocks lies Belle Rock, directly channel, making a very dangerous position. It shows four feet above the very lowest tid is covered by a patch of kelp, which is, however, generally run under by the strengt

* Named by the U. S. Coast Survey in 1854. Lopez Pass is called Maury Pass on the English Admira 1859.

† Named by the U. S. Coast Survey in 1854. We were the first to discover this available anchorage. It Davis Bay on the English Admiralty chart of 1859.

‡ Called Macedonian Crescent by the United States Exploring Expedition, 1841; named Lopez by Coast Survey in 1854.

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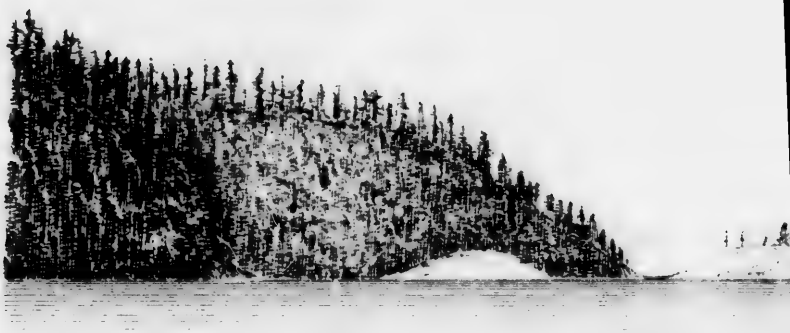
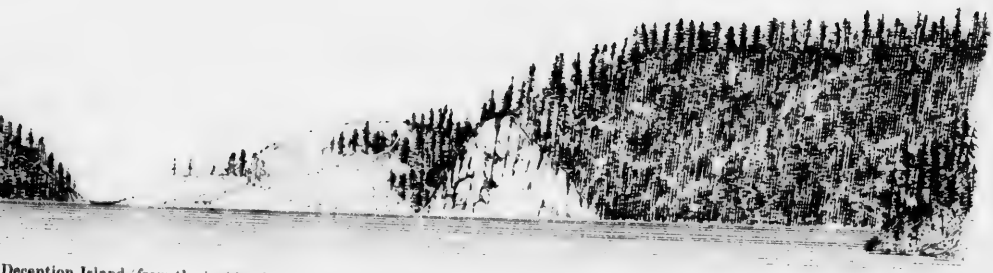


Deception Island : from the inside



Deception Island (from the inside; looking Southwest-ward).

currents. The rip upon it can sometimes be seen when the water is smooth, but with light winds and high tides its existence would not be suspected. On all sides of it the water is very deep. The extent of the rock above water is about twenty feet square. We discovered and named this danger in 1854, and while erecting a signal upon it noticed that the tide rose nearly one and a half feet while the current was yet running ebb at the rate of three miles an hour. Between it and the Bird Rocks there is a submarine ridge with plenty of water, but marked by strong eddies when the surface is smooth. Between it and the nearest point of Burrows Island to the eastward the width of the channel is one and three-fourths miles, with a depth as great as ninety fathoms. The steam-ship *Republic* ran upon this rock, also the pilot-boat *Potter*, and other vessels. Near the Belle Rock the currents run from two to five knots per hour, with strong rips when the winds are adverse.

A *second-class Whistling-Buoy*, painted black and marked "Belle Rock," has been moored in eleven fathoms of water over rocky bottom about one hundred yards north by east (N. by E.) from the rock, and close to the outer edge of the kelp. In very smooth weather this buoy may not whistle. This buoy was established in March, 1889.

FIDALGO ISLAND.

On the eastern side of the entrance after passing Deception Island, the face of Fidalgo Island is high, precipitous, and bare for two or three miles in a northwest direction. This is called *Sares Head*.* Behind it Mount Erie rises to twelve hundred and forty feet. The shore then sweeps to the north, changing to the westward until abreast of, and two miles from, Belle Rock. In the deep bay formed by this western extension of the shore, and lying well off shore, are the *Williamson Rocks*,* a cluster of rocky islets, twenty-six feet high, with deep water close around them. From Deception Island they bear northwest two-thirds west (NW. $\frac{2}{3}$ W.) three miles distant; and from Southwest Island, off Watmough Head, northeast, five miles distant. Half a mile northward of them is *Allan Island*,* which is about three-quarters of a mile in extent and two hundred feet high, with its southern face partly bare. A quarter of a mile off its southwest face lies the *Denis Rock*. This is never bare, but its position is marked by a patch of kelp. It has two feet of water upon it at the lowest spring-tides. We discovered this danger in 1854.

North of Allan Island, and separated from it by a channel a quarter of a mile wide, is *Burrows Island*,* one and a half miles long southeast and northwest, by half a mile in breadth. The island is six hundred and forty feet high, and has a notably flat top, is wooded, and may be seen from the Strait of Fuca. At the eastern end of the passage, between the last two islands, is a small one called *Young Island*.* Through all the channels formed by these islands a good depth of water exists, and no dangers have been discovered.

BURROWS BAY.

The deep bay between Fidalgo Island and Allan and Burrows Islands is named Burrows Bay; it is two and a half miles long north-northwest and south-southeast, and about one and a half miles wide, except near the northern part. At this northern part there is a large lagoon formed by a long, narrow spit running east and west nearly across the whole width. It is called Flounder Bay.

The depth of water throughout Burrows Bay ranges from twenty-five fathoms at the southern entrance to seven fathoms on the east side of Burrows Island. The depth of water is good on the west side, but along the entire eastern side the three-fathom curve extends out fully half a mile, and on the edge of the three-fathom line east-northeast, one and one-quarter miles from the south point of Allan Island, there are sunken rocks. Good anchorage may be had in ten fathoms of water over sandy bottom when the passage between Burrows and Fidalgo Islands bears west, and in ten fathoms near the unnamed passage between Burrows and Fidalgo Islands. But near the channels themselves the depth of water is from twenty to fifteen fathoms.

New Light.—"A *fixed white light* on a white stake has been placed on the sandy spit on the north side of the bay" and nearly abreast the northern point of Burrows Island. The light is about one-third of the length of the spit from the west end. The stake is fifteen feet high, and about twenty feet north of the high-water mark. From the stake the south tangent of Green

* Named by the United States Exploring Expedition, 1841.

Point on Fidalgo Island bears southwest by west three-quarters west (SW. by W. ¾ W.) three-quarters of a mile.

This light serves as a guide through Burrows Bay for the southward, and through the north channel between the north side of Burrows Island and the south shore of Green Point Peninsula.

The light was established October 1, 1888.

The breadth of Rosario Strait at Belle Rock is three and a half miles; but it is soon contracted by *James Island*,* on the western side, and opens into a broad channel running northeast, called the *Bellingham Channel*,† which is about two miles wide at its entrance. A channel nearly one mile wide, called Guemes Channel, runs from the strait more to the eastward and along the north shore of Fidalgo Island, and leads into Padilla Bay.

At the eastern part of this channel on the northern point of Fidalgo Island is the town of Anacostes, with which the sound steamer has regular communication with Seattle and intermediate ports on the eastern shore of Whidbey Island.

Upon Fidalgo Island rises Mount Erie* to a height of one thousand two hundred and fifty feet, covered with woods, and presenting a flat appearance from certain directions, with Sugar Loaf Mountain, one thousand and sixty feet high, just north of Mount Erie. At the south base of Mount Erie there is quite a large lake connecting with the larger one, named Campbell's Lake, lying to the eastward.

Fidalgo Bay, Fidalgo Island.—Two stake lights have been placed on the northeast and southwest sides of the channel from Padilla Bay to Fidalgo Bay.

The Northeast point of the entrance is named *Crandall Spit*, and a *fixed white light* lens lantern is shown at an elevation of eight feet above the water from a white post placed about fifty yards inside the low-water mark.

The approximate geographical position of this light, is:

Latitude	48° 29′ 21″ north.
Longitude	122 34′ 55″ west.

The southern point of the entrance is known as *Weaverling Spit*, and a *fixed red light*, lens lantern, is shown from the top of a white post nine feet high and eight feet above the water. It has been placed about fifty yards from the extremity of the spit.

The approximate geographical position of this light is:

Latitude	48 28′ 56″ north.
Longitude	122 35′ 11″ west.

James Island consists of two heads a mile apart and two hundred and fifty feet high, but connected by a narrow ridge. The southern head is the higher and not very heavily timbered. Close off the west ridge lies another head, connected with Decatur Island by a low beach, but there is a deep channel between this head and James Island.

Thatcher Pass.—Northwest of James Island is an opening half a mile wide on the west side of the strait between Decatur Island and Blakely Island,‡ with twenty-five fathoms in it, but with a rock, covered at a quarter flood, exactly in the middle of the entrance. We discovered this danger in 1854; on the Admiralty chart it has been named Lawson Reef, which has been retained on the Coast Survey chart. The opening is called Thatcher Pass, and the currents rush through at two to four miles per hour. *White Rock*, sixteen feet high, lies under the shore of Blakely Island to partially obstruct this passage; it is of small area and has deep water all around it. On the eastern side of the strait, half a mile farther north, appears *Reef Point*, the southwest extremity of Cypress Island,* off which lie rocks and foul bottom for half a mile on the line to Burrows Island.

BUOY OFF REEF POINT, CYPRESS ISLAND.

To mark the danger off this point for vessels bound through Bellingham Channel between Cypress Island and Guemes Island, there has been placed a *second-class can-buoy, painted black, numbered* **1**. It is placed in twenty-seven feet of water at the lowest tides outside the reef and about half a mile from the southwest point of Cypress Island.

Around this locality extends a large body of kelp, and one rock uncovered at half flood.

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* Named by the United States Exploring Expedition, 1841.

† Named by the U. S. Coast Survey in 1853. The Indian name is Tut-segh.

‡ Named by Vancouver, 1792.

From this buoy the following bearings and distances are given:

The south point of Blakely Island in Thatcher Pass.....	W. S. W.	3½ miles.
The west point of Burrows Island.....	SE. by S. ½ S.	3½ miles.

Vessels bound northward through Bellingham Channel leave it on the port hand; those bound directly through the strait leave it on the starboard hand.

CYPRESS ISLAND.

The southern face of Cypress Island consists of alternate perpendicular white cliffs, and sloping ground covered with fern or trees. On its western side, and one and one-quarter miles from the southwest point, is found a snug little harbor, called *Strawberry Bay*,* which is formed by the retreating of the shore-line and an outlying rocky islet called Strawberry or Hautboy Island.† In this bay excellent anchorage is found in from six to ten fathoms of water over muddy bottom. Good fresh water is plentiful here. A high white cliff is seen to the south of the harbor, from the shores of which rise rapidly the Lake Mountains‡ to an elevation of one thousand five hundred and twenty-five feet, and among whose peaks we found two large sheets of fresh water. These peaks are very noticeable from the Strait of Fuca, and being connected by comparatively low ridges with other hills on the island they present a saddle-like appearance from the southward and westward. (See page 519.)

BLAKELY ISLAND.

Abreast of Strawberry Island the strait contracts to a width of one and a half miles, where the bold rocky face of Blakely Island, forming the western shore, rises to a height of nine hundred and sixty two feet, and is known as Blakely Head. The greatest elevation of the northern part of the island is one thousand and forty-four feet.§

Nearly half a mile southeast from its eastern face lies a very small low rock, called *Black Rock*,‡ ten feet high, and half way between it and the south end of the island is a *White Rock*,‡ sixteen feet high, a quarter of a mile from the shore. The latter has been already mentioned. These dangers have good depths of water around them. In this narrow part of the Rosario Strait the depth of water is about sixty fathoms, and the current goes through with a roar like the sound of a gale of wind through a forest. When at anchor in ten fathoms under the low point, one and a half miles north of Strawberry Island, we found the current running four miles an hour and swirling so much that the vessel had to be steered to prevent her breaking her sheer.

Obstruction Pass.—Thence the strait widens to the northward, and at the north end of Blakely Island, two and a half miles northwest of Blakely Head, at the narrowest part of the strait, two channels lead to the westward around Obstruction Island,† which lies between Blakely and Orcas Islands. Both are narrow, and off the entrance to the south lie some sunken rocks and others above the water. Blakely Island and Orcas Island are three-quarters of a mile apart.

Obstruction Island Light.—On the southwest point of Obstruction Island, at the western entrance to the Peavine Pass, a *fixed red light* has been placed on a white post. The post is fifteen feet high and is twenty feet inside the extreme end of the island. The light is twenty-six feet above high water.

It was established October 1, 1888.

An *Iron spindle* surmounted by a *barrel painted white* has been placed on a rock at the east entrance to the southern pass close to the north shore of Blakely Island.

Bald Peak.—When in the narrowest part of Rosario Strait a very marked perpendicular rocky peak is seen on the north end of Cypress Island, about two and a half miles northward of Strawberry Bay. It is first raised over the low point of Cypress a mile and a quarter northward of the bay, and soon shows rising abruptly from the water's edge to a height of seven hundred and fifty feet. It is called Bald Peak.‖ Abreast of it the channel takes the first turn, changing its course to north half east for four and one-half miles. Half a mile off the north end of Cypress

* Named by Vancouver, 1792. The Indian name for Strawberry Bay is Tutl-ke-teh-nas.

† Named by the United States Exploring Expedition, 1841.

‡ Named by the U. S. Coast Survey, 1854.

§ The English Admiralty charts, Nos. 1911 and 2689, have this erroneously copied at two thousand and forty-four feet.

‖ Named by the U. S. Coast Survey in 1854. The Indian name is Sheh-ung-tlh, signifying the home of the Thunderbird.

Island is a small islet covered with trees, and called *Cypress Rock.** Nearly half a mile west of it there is a patch of hidden dangers, known as Cypress Reef; it has a depth of thirty fathoms close outside it. The comparatively low island one and one-half square miles in extent and half a mile north-northeast of Cypress is *Sinclair Island*,† the highest part of which is towards the eastern end. Off the northeast face of Sinclair Island, and stretching half a mile, is *Bowlder Reef*,‡ visible at extreme low tides. It is covered with kelp, which is, however, generally kept under the surface of the water by the strong currents. A huge, erratic granite bowlder is seen at ordinary tides inside of the outer point of the reef, and bears from it east ½ south three-quarters south (E. ½ S. ¾ S.), distant five hundred yards From the western point of the island the reef bears exactly north, distant three-quarters of a mile. The revenue-cutter *Jefferson Davis* and the steam sloop *Panama* were upon it after we discovered it. On the north side of the island is anchorage in ten to fifteen fathoms of water, half a mile off shore and well outside the line of kelp which fringes this and the western side of the island.

BUOY ON BOWLDER REEF.

Bowlder Reef, just described, is marked by a *second-class nun buoy, painted red and numbered 2.* It is placed in twenty-nine feet of water at the lowest tides, and lies about three-fourths of a mile from the north side of Sinclair Island. From it Lawrence Point, the eastern extremity of Orcas Island on the west side of the channel, bears west by north three quarters north (W. by N. ¾ N.), distant two and one-half miles; and the South Side of Obstruction Island bears southwest by south, distant five and a half miles. This buoy is sometimes called Panama Buoy.

The general direction of the channel shores of Cypress and Sinclair Islands from Tide Point on the former is north-northeast for four miles, and forming the western shore of the strait abreast these islands is the irregular, concave shore-line of the southeast part of Orcas Island between Obstruction Pass and Lawrence Point, a distance of four and a quarter miles. Between these shores the strait is two and three-fourths miles broad, but in part obstructed by the Peapod Rocks lying directly abreast and two miles distant from the northwest face of Sinclair Island, and one mile south-southeast of Lawrence Point.

THE PEAPODS.

The Peapods are three rocky islets lying nearly three-fourths of a mile off the eastern shore of Orcas Island under Port Lawrence. The largest islet is a quarter of a mile long northeast and southwest, but quite narrow. The northeast point is one and one-eighth miles south-southeast from Point Lawrence. It has very deep water close under it. The nearest point of Sinclair Island, on the east side of the strait, is two miles east-southeast from this Peapod. The two small Peapods lie, respectively, a quarter of a mile and nearly five-eighths of a mile south-southwest (SSW.) from the largest, and the same distance from the shore. There is deep water around them and a good channel between them and Orcas Island, if a vessel should be compelled to take it.

ORCAS ISLAND.

This is the largest island of Washington Sound. It has a mountain, named Entrance Mountain, one thousand one hundred and twenty feet high, and two miles from its southern end at Obstruction Pass. The remarkable feature of this island is *Mount Constitution*,§ which rises in a series of bold ridges for three and a half miles from Point Lawrence to a height of two thousand four hundred and nine feet at less than three fourths of a mile from the shore on the northern face. This mountain is the great landmark for all Washington Sound and for the approaches thereto from the Strait of Fuca and the Gulf of Georgia. It is visible from a distance of fifty six miles, and is seen from the vicinity of Point Townsend and from the Strait of Fuca, east of Race Rocks.

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* Named by the U. S. Coast Survey in 1854.

† Laid down by Galiano and Valdez as Isla de Ignasco. It received its present name from the United States Exploring Expedition, 1841.

‡ Discovered and named by the U. S. Coast Survey in 1854. Called Panama Reef on English Admiralty chart of 1859.

§ Named by the United States Exploring Expedition, 1841.

half a mile west of it
of thirty fathoms close
extent and half a mile
s towards the eastern
Boulder Reef,‡ visible
kept under the surface
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-quarters south (E. by
the reef bears exactly
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of kelp which fringes

d red and numbered 2
hree-fourths of a mile
rn extremity of Orcas
north (W. by N. ¼ N.,
bears southwest half
Buoy.
lands from Tide Point
re of the strait abreast
Orcas Island between
miles. Between these
by the Peapod Rocks
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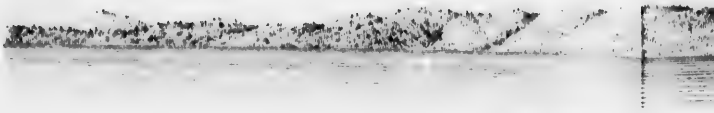
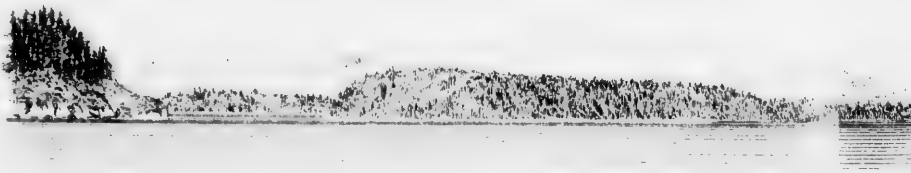
English Admiralty chart



Orcas Island

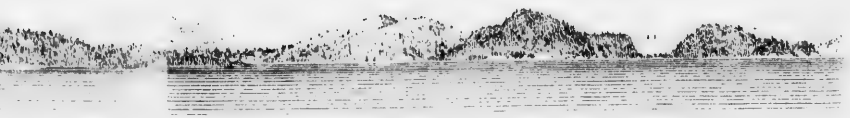
Orcas Island. Mount Constitution, 2,423 feet, SE. by E. ¼ E.



Patos Island. Sucia Islands. Lummi Mountain, W. ¼ S.

Orcas Island

nstitution, 2,423 feet, SE. by E. ½ E., 9 miles.



Lummi Mountain, W. ½ S., 15 miles, 1,560 feet.

Sucia West,
E. by S. ½ S., 3¼ miles.

The extreme length of Orcas Island, northeast and southwest, is twelve miles, and northwest and southeast it is seven and a half miles. It is nearly cut in half by a great arm of the sound entering from behind or west of Obstruction Pass and running six miles to the northwest behind Entrance Mountain and Mount Constitution. This arm is *East Sound*, which is over a mile wide, with deep water. There is a flourishing settlement named East Sound in the northwesternmost part of this deep arm. West Sound is a smaller indentation parallel with East Sound and three miles to the southwest.

The narrow passage known as *Pole Pass*, only one hundred and fifty feet wide, lies between Orcas Island and Crane Island, and is one of the connecting channels between the West Sound (reaching northwestward into Orcas Island) and Harvey Channel on the east and San Juan Channel on the west.

It has been marked by a *fixed red light* shown from a white post four feet high and fifteen feet above the water. It is placed on a rocky point on the southwest shore of Orcas Island, on the north side of the passage abreast Crane Island.

The approximate geographical position of this light, is:

Latitude	48° 36′ 03″ north.
Longitude	122° 59′ 15″ west.

Orcas Island.—Shag rock. South side of Orcas Island, west side of entrance to East Sound.

An *iron spindle nineteen feet high* and crowned with a *white barrel* has been established on Shag Rock. The rock just shows at high water, and the ledge extends about fifty yards to the northward of the rock. There is deep water between the rock and the south shore of Orcas Island, but the passage is not generally used. The spindle was placed in position in March, 1889.

The geographical position of Mount Constitution, as determined by the U. S. Coast Survey in 1884, is:

Latitude	48° 40′ 39″.5 north.
Longitude	122° 49′ 46″.4 west.

The point of Orcas Island stretching farthest east and coming down to the water is Point Lawrence,* and the low, treeless islets and reef, passed one and a half miles before reaching this point from the southward and lying three-quarters of a mile from the shore, are the Peapods.* Deep water is found close to them.

When upon this same mid-channel course the island ahead is Lummi Island.

Lummi Island† is seven and a half miles long northwest by west half west and southeast by east half east. Its southern half is very much higher than the northern, and attains an elevation of one thousand five hundred and sixty feet.

The southern shores of Lummi Island are rocky on the east and west sides. The southern part is one great mountain of homogeneous rock, much of it talc. The southwest face of this mountain is too precipitous for ascent. A conspicuous landmark is the rock slide just east of the Lummi Rocks. The whole mountain is composed of cliffs, ridges, and knolls of rock; the surface is everywhere covered with fragments of rock of all sizes. The fir trees grow wherever the roots can find soil.

The northwestern part of the island is comparatively low, rolling, and covered with fir, which is perceptibly thinned out by logging. The hill at this northern end of the island is three hundred and twenty feet high.

The rock, nearly one hundred feet high off the highest part of the ridge, and a third of a mile from shore, is *Lummi Rock*.‡ This consists of three rocks connected at low water; they are so situated that there is a snug harbor and anchorage for several small vessels, opening to the north. These rocks are high and bare; there are *sunken rocks* off the south point, but quite near the main rocks.

A mile off the south end of this rock, named Carter Point, are the *Viti Rocks*,* about fifty feet high, with good depths of water around them.

There is one principal rock, and at low water the other patches of rock lie to the southward; the nearer one shows above all tides.

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* Named by the United States Exploring Expedition, 1841.

† Called Isla de Pacheco by Eliza in 1790; McLaughlin's Island by the United States Exploring Expedition in 1841; named Lummi Island in 1853 by the U. S. Coast Survey, because inhabited by that tribe. It is known by no other name.

‡ Named by the U. S. Coast Survey in 1854.

Reil's Harbor, towards the southeastern end of Lummi Island, is thoroughly protected with good anchorage. There is fresh water from a nice stream from a little cascade during the rainy season. In summer and autumn it dwindles to a trickling stream. The Indian name of the anchorage is Hiks-pe-slak-en.

There is a *reef* marked by kelp off the entrance to Reil's Harbor liable to pick up a vessel entering from the northward.

Fresh Water.—On the east side of this island, at the parallel of 48° 41′ and about three miles from the southeast point of the island, there is a bight open to the north with a good stream.

No other streams besides this and Reil's Harbor live after dry weather commences.

There is *anchorage* in the bight north of station "Hale" on the northeastern side of the island, and one and a half miles from Reil's Harbor, with protection for small vessels. It is locally known as *Smuggler's Cove*. The Indian name is Ma-men-pe-slaken.

There is *anchorage* in the bight south of station "Rock Pile," on the northeastern side of the island, and half a mile northwestward from the anchorage just described.

Dangers.—There is an extensive reef just northwest from the station "Reef Point" on the southwestern side of island only eighty meters from the shore, but being off the point it might pick up a steamer running close to shore. It is awash at half tide, is not marked by kelp, and has deep water outside of it.

The Indian name of Lummi Island is Smem-ma uk.

A *shoal spot* has been discovered on the eastern side of Lummi Island about one and three quarters miles northwestwardly from the south point of the island. It is about one hundred and ten yards from the shore, and has a least depth of eight feet of water over it, with four to six fathoms of water inside of it.

From this shoal spot the north end of Eliza Island bears east, and the tangent to the east side of Point Frances is north three quarters west (N. ¾ W.).

INATI BAY.

A *shoal spot* has been discovered off the entrance to Inati Bay. It is about one hundred and ten yards long in a north and south direction, and the shoalest part is just bare at low water. From this spot the north end of Eliza Island bears east seven-eighths south (E. ⅞ S.) and the tangent to Point Frances is north one-eighth west (N. ⅛ W.).

Lummi Point (east side of Lummi Island) *New Light.*—A lens lantern showing a *fixed white light* is suspended from a white post eighteen feet high and about twenty-seven feet above the level of the sea. It is placed about eighty yards from the low-water end of Lummi Point, called in the Light-house notices as Taylor's Spit. The light seems to guide vessels through Hale's Passage, and was first shown March 15, 1889.

Abreast of Point Lawrence the channel is over three miles wide, and it there changes its course to northwest for five and a half miles, when the northwest point of Lummi Island bears east-northeast, distant one and a half miles.

From Point Lawrence the north shore of Orcas Island trends sharply to the westward about six miles to Point Thompson* and thence to the west-southwest for three miles, to Point Doughty.* The shore from Point Lawrence to Point Thompson is nearly straight and very high and precipitous, and rises by two or three plateaux to Mount Constitution, which is less than a mile inshore and two thousand four hundred and nine feet high. The shore from Point Thompson to Point Doughty is moderately high and wooded, and a field of kelp and a dangerous reef, named *Parker's Reef*, lie a mile off shore half way and directly towards the Sucia Islands. In mid-channel between the cliffs under Mount Constitution and the northern part of Lummi Island, four miles apart, lies a group of small islands nearly one and a half miles in extent. The two principal islands are Clark* on the east and Barnes* on the left, with a very narrow but deep channel between them. Off the southeast end of Clark Island are two or three islets, called the Sisters.*

The Sisters Islets near Barnes Island are forty-two feet high. The one to the northward is marked by a lone tree is twenty-six feet high. Clark Island is fifty feet above the strait, and Barnes Island forty-five.

The course out of the Rosario Strait beyond Point Lawrence passes between the Clark group of small islands and islets already mentioned and the northern part of Lummi Island; the

* Named by the United States Exploring Expedition, 1841.

thoroughly protected with
cascade during the rainy
The Indian name of the

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Reef Point" on the se
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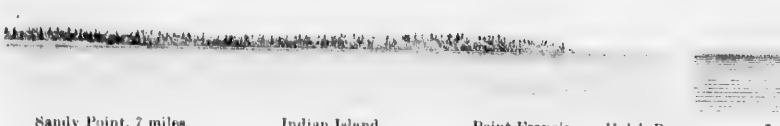
Hale's Passage.
Rosario Strait.

Clark Island.
Barnes Island.
Rosario Strait (North Entrance, West side


Sandy Point, 7 miles.
Indian Island.
Point Francis.
Hale's Passage.
L

Strait.

Lummi Mountain. ESE., 16 miles.

Strait (North Entrance, West side).

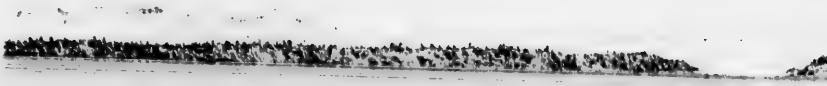
Orcas Island.

Matia, ESE. by E. ½ S.
3¼ miles.
Mount Constitution.

ncis.

Hale's Passage.

Lummi Mountain, SE. ½ S.



Lummi Bay. Indian Island. Hale's Passage (North Entrance), ESE., 5 mi

Chuckanuck and other Hills.
Indian Island. North Entra

ge (North Entrance), ESE., 5 miles.

Lummi Mountain, 1,560 feet.

North Entrance to Hale's Passage, 5 miles.
North end Lummi Island.

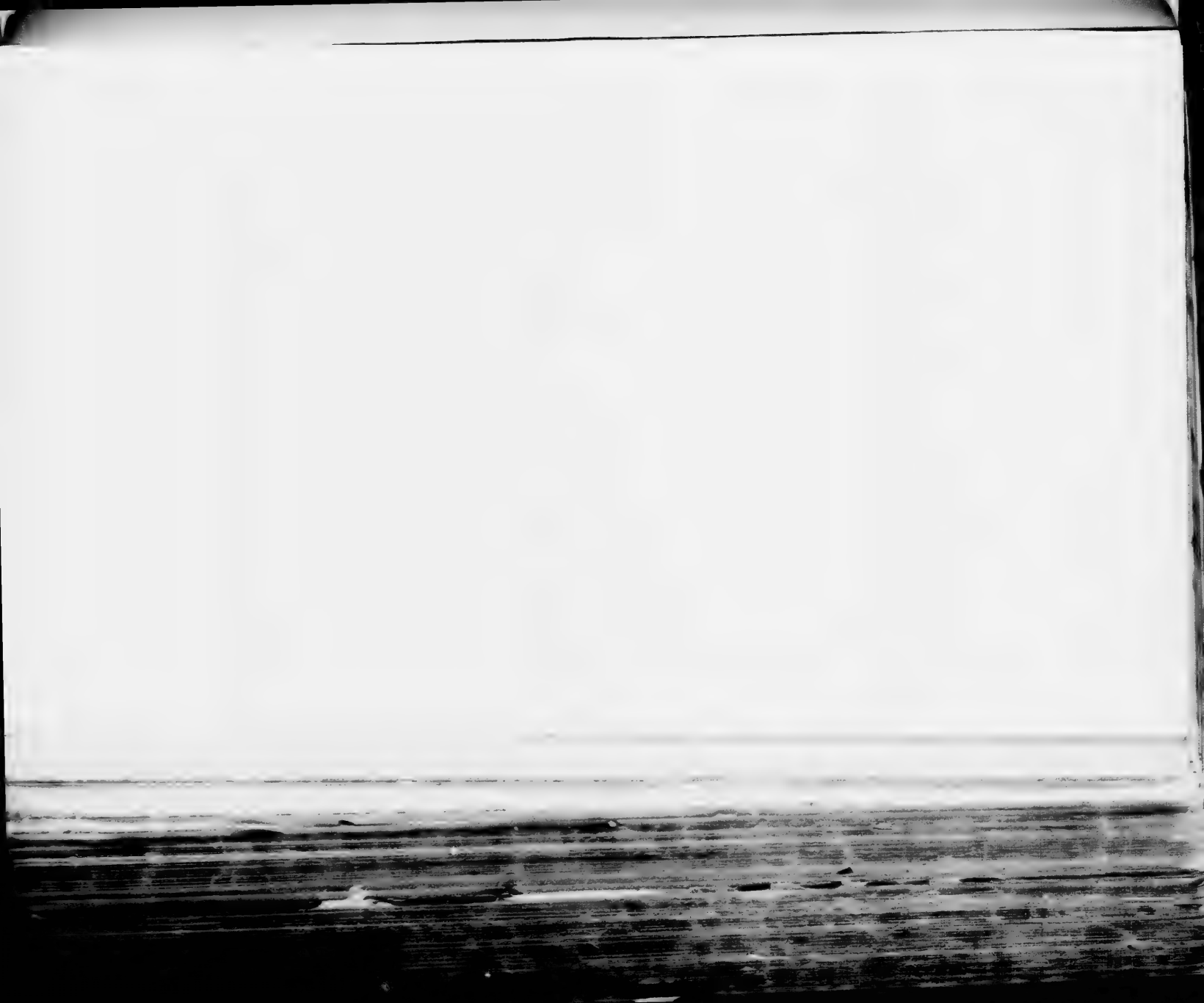
Lummi Mountain.
SE. by E. ½ E., 10¼ miles

Mount Baker, 10,827 feet, 39 miles.

Peaks in Cascade Range.

Sandy Point,
E. by N. ½ N., 4¼ miles.

Lummi Bay.



nel-way is a mile and three-quarters wide. To the west of the group there is another channel-way, a mile and a quarter wide, and but little less direct; but there is very deep water and no anchorage through it. Abreast of Clark Island, and under Lummi Island, is an open and contracted anchorage and shelter from northerly winds, under a low point called Village Point.* The anchorage is in ten to fifteen fathoms of water, but there is no fresh water near the landing, and the large Indian village is now deserted. On the western side of the channel and close to Clark and Barnes Islands the depth of water is fifty and sixty fathoms, and a very strong current runs near them.

The north end of Lummi Island is named *Point Migley*, and is exactly two miles north of Village Point, and the depth of water under this shore is very great; but after passing this point anchorage may be had in ten fathoms and less inside of the line from Point Migley to Sandy Point.

When up with the north point of Lummi Island the Gulf of Georgia is broad open to the northwest, with the island groups to the west-northwest, and the continental shore to the north and east. Northward of the point lies the deep shoal bight known as Lummi Bay, off the great delta of the Lummi River. From the mid-channel course the small group of the Matia Islands lies west-southwest, distant two miles, and to the east-northeast lies Point Migley, distant two miles. To the westward of the Matia Group lie the Sucia Islands, and still farther in the same direction lie the Patos Islands.

The mid-channel northern entrances to the Rosario Strait and the Canal de Haro are just ten miles apart on a west by south and east by north course.

The Matia Islands† consist of one island a mile long east and west, rising to a height of one hundred and twenty feet and a third of a mile wide, with a small islet, forty-five feet above the gulf off the east end of the large islet. This group has already been mentioned. A mile and a half to the westward of them lies the *Sucia Group*, consisting of one large and six small islands, with a reef off the north side of the group, and a beautiful harbor a mile long and half a mile wide, opening to the east, and carrying from ten to fifteen fathoms of water over sticky mud bottom.‡

The southern main ridge of Sucia Island is two hundred and twenty feet above the gulf.

The height of the northern main ridge is one hundred and sixty feet.

There is a reef one-third of a mile off the northeast face; it is bare and marked by kelp.

To the westward of this group lies *Patos Island*, rising to a height of seventy feet above the water, and a much smaller one close to its southwest point. The eastern point of Patos Island bears west three-quarters south, nine miles from the north end of Lummi Island.

LUMMI BAY.

Two or three miles north-northeast of Lummi Island opens a shoal bay, backed by low, marshy ground, which is covered with trees and swamp undergrowth. Into it empties the several mouths of the Lummi River. The main entrance of that stream is at the north part of the bay, and can be reached with boats only at high tide. The northwest boundary of the bay is a low, grassy point with a few bushes upon it, called *Sandy Point*.* From the north point of Lummi Island it bears north by west half west, distant two and a quarter miles. Between these two points anchorage may be had in from four to six fathoms of water, but the south end of Sandy Point should not be approached within less than half a mile. Down the east side of Lummi Island, which is about a mile in breadth, runs Hale's Passage,* three-quarters of a mile wide. It leads from Bellingham Bay. In this passage one and a half miles, and bearing east by south half south from the north end of Lummi Island, is a low, sandy point, upon which was established in 1853 a secondary astronomical station of the U. S. Coast Survey. Its geographical position is:

Latitude	48° 44′ 01″.2 north.
Longitude	122 41 14 .7 west
Or, in time	8h 10m 59s.0.

This places the north end of Lummi Island in—

Latitude	48° 41′ 55″.6 north.
Longitude	122° 42′ 49″.8 west.

* Named by the United States Exploring Expedition, 1841.

† Called "Edmund's Group" by the United States Exploring Expedition, 1841. The small one on the east is called Puffin Island on the English Admiralty chart of 1859; in 1854 it was named Matia East by the U. S. Coast Survey.

‡ Partially examined by the U. S. Coast Survey in 1853 and 1858.

The following geographical positions of locations in Rosario Strait will serve to check the courses and distances we have given:

Matia Island, east—

Latitude	48°	41′	39″.2 north.
Longitude	122	49′	06″.8 west.

Village Point, Lummi anchorage—

Latitude	48°	43′	03″.2 north.
Longitude	122	43′	00″.2 west.

The South Point of Strawberry Island—

Latitude	48	33′	36″.3 north
Longitude	122	44′	04″.7 west

The Southwest Island,* off Watmough Head—

Latitude	48	24′	55″.7 north
Longitude	122	49′	12″.3 west.

Rosario Strait was first seen by Quimper from Port Discovery, and called "Boca de [illegible]." From Protection Island he could see through the whole length of the strait; he could [illegible] Deception Pass from there, although this has been credited to him.

Eliza passed through it in 1791, and called it the Canal de Fidalgo.

Vancouver passed through it in 1792, and gives its peculiarities very well.

Galiano and Valdez came through it in 1792, and called it Canal de Fidalgo.

The United States Exploring Expedition surveyed it in 1841 and called it Ringgold's Pass Channel. It was evidently considered the main ship channel through Washington Sound.

The English Admiralty chart of 1847 called it Rosario Strait, and by this name it is [illegible] known on the Pacific.

Approaches to Bellingham Bay.—All of Vendovi and Jack Islands, the southeast part of Gnemes Island, and the northwest part of Samish Island are of metamorphic rock, with bold, [illegible] shore lines and generally without beaches. The rest of Gnemes and Samish Islands have a [illegible] soil covered with a dense growth of fir and thick underbrush. Some parts have been cleared by the settlers.

There are no fresh-water streams on Samish, Vendovi, and Jack Islands, and very little water on Gnemes.

There is bold water around Jack and Vendovi Islands.

There is a snug little harbor on the northeast part of Vendovi Island, where moderate sized vessels can anchor and swing, sheltered from all ordinary winds.

BELLINGHAM BAY.

This bay was formerly one of the most frequented in Washington Sound. It lies east of [illegible] Rosario Strait, and is formed by deep indentations in the main shore, and although large it is [illegible] locked by the islands lying on the south and east sides. The general direction of the bay is [illegible] west and southeast, and its length, including the broad flats at either end, is fourteen miles, extending from latitude 48° 33′ to latitude 48° 47′; the width averages four miles. The coal [illegible] have been abandoned, and now the shores and back country supply many of the mills with [illegible] as far south as Seattle. The military station has been abandoned for a long time. There are several towns upon the northeastern part of the bay, Bellingham, Sehome, Whatcom, and [illegible] the latter at the mouth of one of the branches of the river. The steam-boats from the sound [illegible] their regular trips to the bay. The usual channel is from the southern part of Rosario through the Bellingham Channel, which passes between the northwest part of Fidalgo Island and [illegible] Island on the east, Cypress Island and Sinclair Island on the west. The chart is the [illegible] guide for the navigation of the channels and bay.

Anchoring.—Underlying the "good sticky bottom" there is a stratum of sandstone which [illegible] vents the anchor from taking hold, and vessels drag in southeasters, which blow with great [illegible] up this bay and cause a very rough sea.

William Point, New Light.—A lens lantern showing a *fixed white light* is suspended from a white post ten feet high and about thirty-five feet above the level of the sea. It is placed [illegible]

* So named by the U. S. Coast Survey in 1854; called Colville Island on the English Admiralty chart, 2689

feet inside the edge of the bluff and about one hundred yards west from the north end of the point. It was first shown March 15, 1889.

Samish River.—This stream, in the southeast angle of Bellingham Bay, can be ascended by small steamers for a few miles, when the tide is high enough for the vessel to enter the river. The entrance to the channel at the edge of the tide flats has about three feet of water at low tide, with slightly deeper water inside.

Chuckanut Bay.—This bay is the recession of the eastern shore of Bellingham Bay, and is over two miles long north-northwest and south-southeast, by one mile deep. It has well marked points at the north and south with a large islet close to the northeast of the latter point. This South Point lies north fifty-two degrees east (N. 52° E.) three miles from the North Point of Eliza Island. The greater part of the shore-line is sandstone, and the land rises to thirteen hundred feet in half a mile and then drops sheer two hundred feet. The stone is of good quality, and is extensively quarried for building purposes. The dip is sixty degrees and faces towards the west. There are traces of coal here, but of poor quality.

There is good anchorage and protection in the south part of Chuckanut Bay, but the north part of the bay is shallow.

Fairhaven Bay is one of the snuggest harbors on all these waters, being exposed only to the north winds, which, however, seldom blow.

The Starr Rock.—This danger is a small ledge about forty yards long and lies in a north-northeast and south-southwest direction, with only four feet of water upon it at the lowest tides. The ledge lies three hundred and eighty yards off shore, and there is a channel carrying from five to six fathoms inside of it. It is not in the usual track of the steamers running to and from Whatcom and Schome, but lies less than two hundred yards north one quarter west (N. ¼ W.) from the western angle of the *Bellingham wharf.* It is nearly in range with the outer end of the old Coal Wharf (next northward) and the coal bunker at the head of the Schome wharf.

It was struck by the steamer *Geo. E. Starr* August 25, 1888, when making a landing at the Bellingham wharf and mill.

This dangerous ledge is marked by a *third class nun buoy* with *black and red horizontal* stripes; and the buoy is placed as nearly as practicable on the shoalest spot.

From the buoy the following bearings are given to locate it:

West end of warehouse on Whatcom wharf	N. ¼ E.	1¼ miles.
South smoke-stack of Bellingham saw-mill	SE. by S. ¼ S.	¼ miles.
The northeast angle of Fairhaven wharf	S. ¼ E.	¼ miles.
Tangent to Point Francis	SW. ½ W.	4½ miles.

It lies one and two-fifths miles south by west (S. by W.) from the mouth of Whatcom Creek.

BELLINGHAM BAY.

Schome has now less than one hundred population. The coal mines were operated until ten years ago.

Whatcom' Creek.—This stream is the outlet of Whatcom Lake, which is three miles from Schome and three hundred and fifty feet above the sea level. For the last mile the stream flows through nearly level country and has little current. At the mouth there is a mill-dam, from which the creek flows over ledges of rocks into the bay, forming a pretty cascade. The volume of water varies; in the late summer there is not enough to run the saw mill continuously.

The Indian name of the creek is What'-com.

Whatcom.—This place, at the mouth of the creek, was settled in 1853. The saw-mill was erected in 1853, and the town site laid out in 1854. The population is about four hundred, and there is now an extensive wharf built out into deep water.

Fort Bellingham was built in 1856, three miles north of Whatcom. It was formerly a stockaded post, but only one block-house is now standing.

The Nooksacht River.—This is a mountain stream. When the river is full steamers of light draught ascend it regularly as far as Lynden, a distance of sixteen miles. There are broad shoals off the mouth of the stream, and a small boat can not get into the river at low tide.

Lummi Village is on the Indian Island at the mouth of the Nooksacht. It is an Indian settlement, and salmon fishing is the principal industry.

Point Frances, New Buoy.—A *second-class nun-buoy*, painted *red* and numbered 2, has been moored in five fathoms of water close to the end of the spit that makes off from the point. It lies

at the southeast part of Hales Passage, and bears west by south one-quarter south (W. b ... five-eighths of a mile from the southern end of the point. It lies on the western edge of ... ridge of three to five fathoms, which stretches from Point Frances to Eliza Island. It ... lished March, 1889.

Point Frances.—This is part of the Lummi Indian Reservation. The "island" is ... with the land north of it at high water when the passage way is fifty-five yards wide.

The Indian name of this island is Skul-lick sion.

Eliza Island.—This is rocky at the north point and around the south end. The rest ... clay and gravel. There is no fresh water on the island.

There is a *shoal* off the north end of the island to the westward.

There is a *good harbor* and anchorage on the southwest side of the island deep in ... with muddy bottom and a steep shingle beach.

Sunken Rock.—A single bowlder with eight feet of water over it has been discover... midway between Point Frances and Eliza Island. This rock bears northwest by north ... north (NW. by N. ½ N.) from the north end of Eliza Island, and southwest by west ... west (SW. by W. ½ W.) from Chuckanut Rock.

Sunken rock.—There is a three fathom rock in mid-channel between the south point ... Island and the south point of Eliza Island.

A *shoal spot* about fifteen yards long has been found three hundred and twenty-eight ... Eliza Island, with a least depth of five feet of water over it. There is a depth of fifte... outside of it and from seven to nine fathoms inside of it. From this shoal spot the dea... the extreme west point of Eliza Island bears southeast by south one quarter south (SE. ... S), and the south point of Lummi Island bears south by west (S. by W.).

Bellingham Bay was discovered by Eliza in 1791 and named Bahia de Gaston. It ... surveyed by Whidbey under Vancouver's order in 1792, and then received its present n... the old Admiralty charts the upper part was named Gaston Bay, but they now n... Bellingham Bay.

Before passing to the description of Admiralty Inlet, we may state that the amoun... line in the Washington Sound, Bellingham Bay, Possession Sound, etc., is six hundred and ... seven miles. During six summer seasons that we worked in the Strait of Fuca, Washingt... and Admiralty Inlet we never heard thunder except in one instance, at Cypress Island, ... Strait (1854).

THE CANAL DE HARO AND ROSARIO STRAIT.

COMPARISON OF THE CHANNELS.

With plenty of wind no navigation could be better than that in these channels; but ... sailing vessels will frequently be jammed close to the rocks, with only a few fathoms ... inside of their positions, but forty or fifty on the outside, and boiling, swirling currents ... der towing with boats utterly impossible. Frequently, too, boats have been nearly sw... the current rips that exist through them. Off east point of Saturna Island, as an instance ... oared whale boat entirely failed to hold her own against the current, which we judged to ... *ing* (the only term applicable) at the rate of seven miles per hour. Throughout the Canal ... the roar of the conflicting currents can be heard for miles, and the ... current runs ... six miles per hour. No anchorages exist in this channel except at Cormorant Bay and ... Channel, on the north side of Sidney Island. There are several known hidden dange... channel: *Kelp Reef*, southeast ... of Darcy Island; *Unit Rock*, nearer to Darcy Island, and ... *Rock*, north of Gooch Island. The channel makes a right angle in its course, but is a m... and has much deeper water than Rosario Strait, which is less curved, and has several ... and known dangerous rocks with a current of about one and a half miles less per ho... steamers either channel, or even some of the narrow intermediate channels, may be use... winds are apt to fail in both channels, and during summer frequent calms prevail.

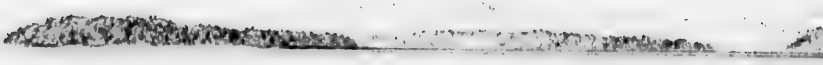
Steamers bound through the Gulf of Georgia from the Strait of Fuca take the Canal ... to the entrance of Swanson Channel, abreast the west end of Stuart Island, through that ... to the Active Pass, and thence to the Fraser River and the Gulf of Georgia, thus avoi... currents of the northern part of the Canal de Haro between Saturna and Patos Islands.

Lummi Island, Southwest part, E. by S. ¼ S., 16 miles. Matia Island, ESE., 5

Approach to North Entrance Rosario Strait from WNW.

Approach to North Entrance Canal de Haro from Alden Bank, S

Skipjack Island,



Patos Island, SW. ¼ W., 5 miles. East Point Light-house, SW. by W. ¼ W., 9 miles. Tum

Matia Island, ESE., 6¼ miles.

Sucia Island.

ario Strait from WNW.

anal de Haro from Alden Bank, SW. by S., 4 miles.

Turn Point, SW., 17½ miles.

Moresby Island, 20 miles.

Skipjack Island, 9½ miles.

Stuart Island.

Pender Island, 15 miles.

Patos Island, SW. ½ W., 5 miles

., ½ W., 9 miles.

Tumbo Island, SW. by W. ½ W., 9 miles

Saturna Island, SW. ¼ W., 6 miles, 800 feet. Western part, 820 feet

Northeast Point, E. ¼ N., 3¾ miles.

Approaches to Canal de Haro from Ald
Patos Island
Southwest Islet, E., 3 mile

Sucia West.

Point Lawrence.

Mount Constitution
Orcas

stern part, 820 feet

Mayne Island, W. ¼ S., 11 miles

ches to Canal de Haro from Alden Bank.

Patos Island.

Southwest Islet, E., 3 miles.

Sucia Islands.

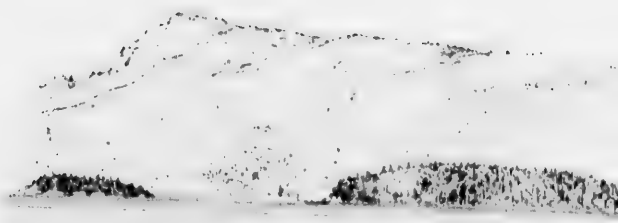
Sucia West, E. ¼ S., 6 miles.

Lummi Mountain, E. by S., 17¼ miles, 1,560 feet.

Mount Constitution, 2,423 feet, E. by S. ¼ S., 11¼ miles.

Orcas Island.

Entrance Mountain
1,130 feet



Approaches to Douglas Channel from Alden Bank

Matia East, 3¼ miles. Mount Constitution, 2,423 feet, SSE., 7¼ miles.

Orcas Island

Point Thompson.

East Point, Sucia Island, S. by W. ¼ W., 3¾ miles

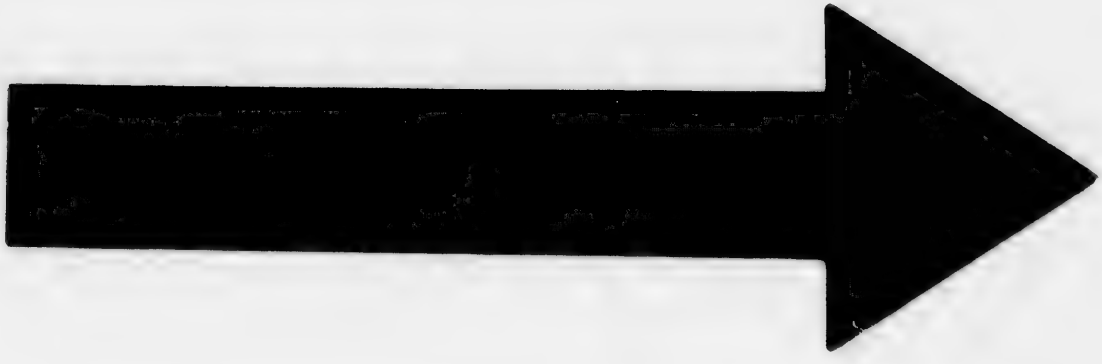
from Alden Bank
21 feet, SSE., 7¼ miles.

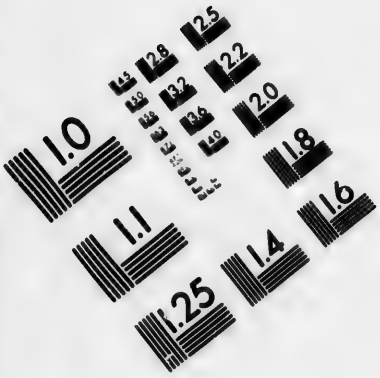
Matia Island.

West end Matia Island, S. ¼ E., 3¾ miles
From Buoy on Alden's Bank

W., 3¾ miles

Sucia Islands





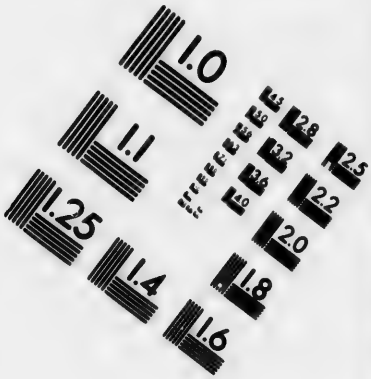
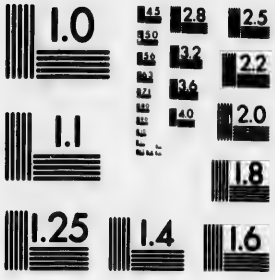
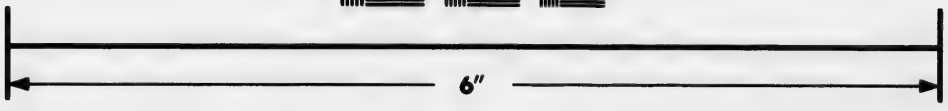
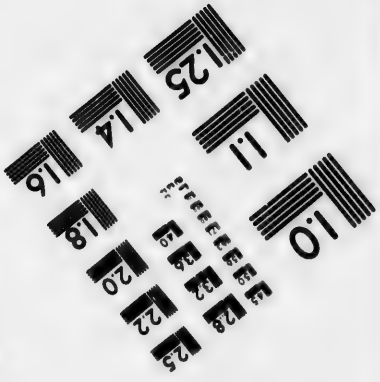


IMAGE EVALUATION TEST TARGET (MT-3)







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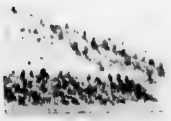


S. ¼ E., 3½ miles
Buoy on Alden's Bank

THE GULF OF GEORGIA.*

Once in the Gulf of Georgia, through either the Canal de Haro or the Rosario Strait, the three-mile face and the forest-covered cliffs and bluffs of Point Roberts† (showing almost as an island) are seen in the northwest. On the west the mountains of Vancouver and its bordering islands rise up precipitously, and on the eastern or main shore a series of wooded cliffs two hundred feet high. Far to the eastward the Cascade Range is seen rising above intermediate mountains with the snow-covered summit of Mount Baker,‡ which rears its head ten thousand seven hundred feet above the level of the sea. To the west-northwest stretch the waters of the Gulf of Georgia, nine miles wide abreast of Point Roberts, where it is narrowest, but spreading out to twenty miles, and having a length of one hundred and twenty. A short distance above the forty-ninth parallel it receives the Fraser River (the third great stream of the northwest coast), the tributaries of which rise in the flanks of the Cascade range of mountains.

If bound up the Gulf of Georgia, sailing vessels hold well to the eastern shore to avoid the rushing currents and to take the chances of an anchorage if the wind fails.

The currents in the Gulf of Georgia southward of the parallel of Fraser River are very strong and conflicting, and the rips are dangerous to small boats. With an adverse wind the short, sharp waves of the current rips are dangerous to the smaller and lightly built vessels on these waters. The worst current rips are probably in the space between Point Roberts and the north entrance to the Canal de Haro.

ALDEN BANK.

Entering the gulf from the Rosario Strait there is but one known danger in the deep waters, and that is on the extensive shoal lying on the line between Lummi Island and Roberts Bluff. Inside of the ten-fathom curve the length of this bank is three and one fifth miles, and the general direction is northwest and southeast; the average width is one and a quarter miles, but a vessel will not pick it up unless by ranges. The general depth of the bank is three to eight fathoms, but a *dangerous spot* has been found with only fourteen feet of water upon it. On the southwest side, towards the Sucia and Patos groups, the depth increases rapidly to sixty fathoms; on the inner side towards the main shore the depth drops quickly from ten to thirty fathoms. The passage between the bank and the Sucia Islands is two miles wide, and the eastward channel is three and a half miles wide. The bottom on the bank is, in general, sandy, with small patches that are rocky, upon which kelp is growing, but it is not readily made out, as we have sailed over it without seeing any kelp. Barring the danger, which is now marked by a buoy, this bank is a good anchorage for sailing vessels that are bound to the northwestward and have become becalmed with adverse currents. Care must be taken when a vessel is anchored here, because the swirls and eddies of the currents around and over it will be very apt to foul the anchor. Sailing vessels from Rosario Strait bound northwestward should keep between the bank and the eastern shore, the more especially as anchorage may be had under the shore when the winds fail and the current is ebb. A vessel may anchor on the bank in eight to six fathoms of water when the west end of Patos Island is on with Java Head on the southeast part of Saturna Island on a course southwest half west, and Mount Constitution is over the eastern part of Matia Island. When the buoy is found, a vessel may anchor to the northwest of it for two miles, to the northwestern edge of the ten-fathom line. There will be less swirling of currents here than on the tail of the bank, which runs one mile south from the buoy to a narrow point, and then drops off very suddenly into deep water.

---

* Named by Vancouver in 1792; according to his charts the Gulf of Georgia includes Washington Sound and the waters of the Strait of Fuca east of New Dungeness. The name is now applied to the great body of water lying between Vancouver Island and the main land, and northwest of Washington Sound.

† Named by the United States Exploring Expedition, 1841. The Indian name is Now-uk-sen.

‡ Named by Vancouver, 1792. In April, 1865, the sharp peak was reported to have sunk one thousand or fifteen hundred feet after a violent eruption; but in 1867 we saw no change from its appearance between 1853 and 1857, and in 1870 our observations for determining the elevation showed that no appreciable change had taken place. In 1854, when observing upon the mountain from Obstruction Island, we saw it suddenly break out into a state of eruption, the volumes of smoke and ashes rising two thousand feet above the summit of the mountain. The next day the activity had apparently ceased, but the top of the mountain was denuded of snow, or it was covered with ashes. In 1870 we saw it in activity, the volume of smoke and ashes rising about seven hundred feet above the crater.

BUOY ON ALDEN BANK.

To mark the shoalest spot on this bank a *second-class can-buoy with red and black h[illegible] stripes* has been placed in three and a half fathoms of water. It can be passed on either hand, giving it a good berth. The shoalest water near it is fourteen feet at the lowest tides.

The position of the buoy is located by the following bearings and distances: Sandy Point, forming the northwest side of Lummi Bay, is north seventy seven degrees east (N. 77° E.) distant four and one-half miles; and Point Whitehorn, south side Birch Bay, is north twelve degrees west (N. 12° W.), distant five and three-fourths miles. From the shoalest spot the range northwest tangent of the Sucia on with the east tangent of Skipjack Island is south forty-one degrees west (S. 41° W.); the former is distant four and a fourth and the latter nine and [illegible] miles; and the cross range is Mount Constitution, showing between the eastern islet of the Mi[illegible] group and the larger one bearing south twenty degrees east (S. 20° E.), the islet distant three and a fourth and the mountain seven and a half miles.

This shore was discovered and named by the U. S. Coast Survey steamer *Active* in 1853.

SANDY POINT.

This has already been referred to. It is a low, narrow, sand ridge bordering the Gulf of Georgia; it is one mile long, stretches towards the south-southeast, and is covered with coarse grass and a few low bushes. On the inside towards the mouth of the Lummi River it is bordered with marsh. The extreme end is marked by bowlders. Inside of it the broad Lummi Bay, three and one-half miles wide to the southeast, is very shoal, and its eastern part is fringed with marshy land. Outside of the point the three-fathom line extends nearly one-third of a mile, and the ten-fathom line is one-half mile from the beach. We have anchored in seven and a half fathoms three fourths of a mile southeast from the point, but it is an uncomfortable place with a southwest wind and swell.

The geographical position of the point is:

Latitude	48° 47′ 13″.0 north.
Longitude	122° 42′ 29″.2 west.

It lies two and a half miles north sixteen degrees west (N. 16° W.) from Point Migley, the northern extremity of Lummi Island.

The Indian name of this point is Sly-ak'-son.

POINT WHITEHORN.

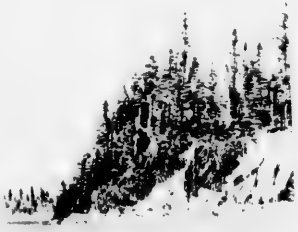
From Sandy Point to Point Whitehorn the distance is seven and a third miles, and the bearing is north fifty-one degrees west (N. 51° W.), but midway there is a deep recession of the shore to the northeast one and a half miles. There is a short line of low shore in the northernmost part of this bight, and one mile westward of this is the slightly projecting cliff named *Cherry* off which the three-fathom curve is only two hundred and fifty yards distant, with deep twenty fathoms within half a mile. From Cherry Point to Point Whitehorn there are [illegible] patches of kelp lying outside and inside the three-fathom curve.

Commencing about two miles northwest of Sandy Point the shore is a steep bluff, about [illegible] hundred and fifty feet high, and covered with wood. At Whitehorn the face of the point [illegible] away by the action of the sea, and the cliffs show bright with rocks at the base. The height of the cliffs at this point is one hundred feet.

There is a sunken rock just outside the low-water line, and straggling kelp surrounds the point. There is a depth of three fathoms within a fourth of a mile of the base of the cliffs. From it the west end of Patos Island bears south twenty-five degrees west (S. 25° W.), distant [illegible] and a half miles; and Point Migley, the north point of Lummi Island, is south forty-four degrees east (S. 44° E.), distant nine and a third miles. We experienced an earthquake at this point in 1857.

Point Whi

Birch Point.
Birch Bay (?



Birch Bay. Gulf of Georgia.
Point Whitehorn, E.,

Gulf of Georgia.
Point Whiteborn, NW ½ W., 2¾ miles.

Birch Point. Gulf of Georgia. Point Whiteborn.
Birch Bay (N. 1 mile), NWby N., 4 miles.

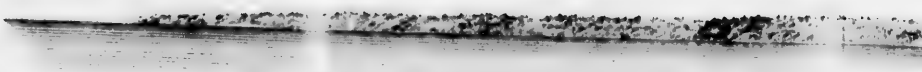
Birch Bay. Gulf of Georgia.
Point Whiteborn, E., ¼ mile.

Patos, in the distance. Sucia Islands, W. by N. ¾ N., 2¼ miles.

Approaches to North Entrance Cana

San Juan Island, 1,087 feet, 19 miles.

East Point Light ho
S. ¾ E., 3¼ miles.



Kwomais Point, NW. by N., 13¼ miles. Semiahmoo Bay.

Approaching Birch and Semiahmoo
Birch Point, NNW., 5 miles.

a Islands, W. by N. ¼ N., 2¼ miles.

proaches to North Entrance Canal de Haro from NNW.

and, East Point Light-house. Tumbo Island.
iles. S. ¼ E., 3¼ miles.

proaching Birch and Semiahmoo Bays from Alden Bank.

Birch Point, NNW., 5 miles. Birch Bay Point Whitehorn, N. by W., 6 miles

Kwomais Point, NW. by N. 13¼ n. miles

Point Whitehorn, N. by W. 6 miles

BIRCH BAY.

The southern point of this fine bay is Point Whitehorn, just described, and the northwest one is formed by a long, rounding, high bluff bearing exactly northwest from Whitehorn, and about three miles. This rounding head is Birch Point. It is heavily wooded to the water's edge, where the land rises four or five feet as a narrow bench and then continues inland in a long, round-hill covered with the Douglas fir. The hill is about three hundred and fifty feet high and the eighty feet. Directly off the high water mark is an erratic bowlder about fifteen feet in extent and four feet above high water.

Birch Point is known as South Bluff on the English charts.

The bay runs northeast by north two and a half miles, with a width of one and a half miles. The bottom is very uniform, with capital holding ground of soft mud in from four to six fathoms water. The line of six fathoms runs from Point Whitehorn to Birch Point. The head of the bay has a broad low-water area and three fathoms one mile from the northern shore. The immediate shores are low and edged with marshy patches, thick undergrowth, and heavy wood. No directions are necessary for entering, as there are depths of fifteen to twenty fathoms a mile outside, with soft muddy bottom. It is broad open to the southwest and west, but during the heaviest southeast weather no swell is felt here in a properly selected anchorage. A good berth is found in four fathoms of water, over soft mud, when Whitehorn Point bears south, distant one mile.

We searched for fresh water, but found none in the space of more than a mile along its southeastern side, but there is some in the northern part of the bay behind the broad flats.

The geographical position of Point Whitehorn, as determined by the U. S. Coast Survey, is:

Latitude	48° 53′ 01.8″ north.
Longitude	122° 47′ 01.9″ west.

There is a wharf and warehouse at the outer end on the south shore of Birch Bay about one and a half miles inside of Point Whitehorn. The wharf is one hundred and eighty yards long.

In June, 1792, Vancouver anchored in Birch Bay while he made a boat expedition of more than one hundred miles to the northwest. He named the bay on account of the abundance of black birch which grew upon its shores. He placed it in latitude 48° 53½′. Vol. I, pages 315, 316.

In June, 1792, Galiano and Valdez called this bay the Ensenada de Garzon. The Indian name is Tsan wuch.

This is the farthest point northward on the eastern shores of the Gulf of Georgia to which our personal examinations have extended.

SEMIAH MOO BAY.

Between Birch Point and the eastern angle of Point Roberts, distant eight miles from each other on a north eighty-two degrees west (N. 82° W.) course, there opens a very extensive area of water that has a navigable depth in the northeast part, and is only an extensive shoal in the northwest part. The former is known as Semiah'moo Bay, the latter as Boundary Bay.

From Birch Point the shore-line runs nearly north for two and a third miles, and the land falls gradually in height to the commencement of a low, narrow sand spit, which continues one mile farther with a trend a little more to the eastward. Behind this spit is Drayton Harbor. The shore to the northward of this spit is four and a half miles north from Birch Point, and runs east and west four miles, to Kwo-mais Point,* which forms the northwest limit of Semiah'moo Bay. Birch Point is long, rounding, and bluff. It is about two hundred feet high, and is densely wooded with the Douglas fir, which attains a height of eighty feet or more. The deep bight lying behind Birch Point and Kwo mais Point may be reckoned Semiah'moo Bay. The latter point is a comparatively low, rounding, bluff point one and a half miles north of the northwestern boundary line between the United States and British Columbia, and five miles northwest from Birch Point.

The depth of water in the bay ranges from eleven fathoms to three fathoms half a mile from shore, except one mile east of Kwo-mais Point, where the three-fathom line runs close under the shore. The bottom is soft mud and the holding-ground is good, but the whole bay is directly open to the south, and the southerly winds having a long reach send in a considerable sea. Nevertheless there is fair protection along the shore north of Birch Point, unless the wind works round to the southwest, and then a vessel might get shelter inside the spit forming Drayton Harbor.

* Called North Bluff on Admiralty chart, No. 2689.

In the northernmost part of the bay where the shores are low and the shoal water is one mile broad off the beach, there is a small stream, called Tah-la-loo Creek.* The position of the stream is roughly given by the three hundred-feet hillock lying about a mile northwestward of [illegible]. It was inside the mouth of this stream that the American Commissioners of the Northwestern Boundary Commission encamped (1857) on account of there being fresh water here. But the mouth of the stream can be reached only by a canoe at low water.

Tides.—The Corrected Establishment, or mean interval between the time of the Moon's transit and the time of high water, is 1V^h 59^m, and the difference between the greatest [illegible] intervals is 2^h 24^m. The mean rise and fall of tides is five and nine-tenths feet; of [illegible] seven and one-tenth feet. The mean duration of the flood is 6^h 14^m; of the ebb, 6^h 11^m, and [illegible] stand, 29^m.

The two tides of the same day are generally unequal in proportion to the Moon's [illegible].

The time and height of every tide of the year may be obtained by consulting the Pacific Coast Tables, published annually by the U. S. Coast and Geodetic Survey. For the time and height of any required tide first obtain from the tables the time and height for Port Townsend; to the time of the tabular high water add one hour, and to the tabular height add seven tenths of a foot; to the tabular time of the low water add one hour and thirty-three minutes, and to the tabular height add one-tenth of a foot.

On the Spanish charts of Galiano and Valdez (in the great Spanish Maritime Atlas, Madrid, 1795) the name of this bay is Ensenada del Engaño, or Deception Gulf. In the Admiralty chart of 1847 this bay, including Boundary Bay, was called Shallow Bay.

A map of this bay was published by the U. S. Coast Survey in 1858.

DRAYTON HARBOR.

From Birch Point the shore runs a very little east of north for three and two thirds miles, gradually decreasing in height to within a mile of the end of the long, low, narrow spit, which is one mile and a third forms the western boundary of this harbor, and is known as Tongue Spit. Just before the spit commences the land behind it is three hundred feet high. This spit is covered with coarse grass and drift wood and a few fir trees. The extremity of the spit is now occupied by the town of Semiah'moo. The shore northward and eastward of this point is three-quarters of a mile distant, but the water is shoal, except close under the point of the spit. The harbor is well-sheltered, and extends eastward two miles, with an average width of one and a half miles. Nine-tenths of this area is filled by flats and shallow water, but just east of the point and close to it there is an area of nearly half a mile square having three to six fathoms of water, with a narrow, deep channel connecting it with Semiah'moo Bay and running close under the point.

The southeast part of the bay is flat and marshy, and is separated from Birch Bay by about a mile of low land densely wooded.

Outside and west of Tongue Spit there is a broad low-water beach, and the three-fathom curve extends nearly half a mile from the shore. A vessel must not, therefore, approach the spit nearer than half a mile, or two-thirds of a mile, in five fathoms of water until the extremity of the spit bears east half south, when it can be steered for and passed close to in five or six fathoms water, and then continue to the southeastward until the end of the spit bears northwest three eighths west (NW. by W. $\frac{3}{8}$ W.) half a mile distant, where an anchorage is had in six fathoms of water over soft sticky bottom. South of this position the bay shoals gradually to two fathoms in half a mile, with muddy sticky bottom. There is room in this anchorage for three or four vessels, as well as for several small ones, and they are perfectly sheltered. On the west side of Tongue Point a vessel may be beached for repairs. The border of the shoal ground on which the anchorage is marked by poles stuck on the edge of the flats.

New buoy and directions.—A *red spar buoy* has been placed at the entrance to Drayton Harbor at the turn of the channel. It bears west half a mile (one thousand yards) from the end of the wharf on the extremity of Drayton Spit. It is just off the shoal and lies in six fathoms of water.

To enter the harbor follow the shores from the southward, but not nearer than three quarters of a mile; round the buoy and run direct to the end of Semiah'moo wharf.

* Campbell River on the Admiralty chart, No. 2689.

Eastern Point. Point Roberts as an Island, WNW., 6 miles. Western Point.

West Point, NW. by N. Point Roberts as an Island. East Point, N. by W. ½ W., 10¼ miles.
Mountains north of Burrard Inlet, distant 36 miles; elevation, 4,800 feet.

Point Roberts. West, 5 miles. Distant Mountains on Vancouver Island.

The approximate geographical position of the end of Tongue Spit, as determined by the U. S. Coast Survey, is:

Latitude ..... 48° 59′.5 north.
Longitude ..... 122° 46′.2 west.

Tides.—The times and heights of the tides are given under the description of Semiah'moo Bay.

There are now three wharves at the end of the point and bordering the channel.

On the low point one mile east from the end of Tongue Spit, on the opposite side of the bay, there is a new settlement, called Blaine. On the Admiralty chart this point is called Willow Point.

There is a wharf one-half a mile in length stretching southward from the town of *Blaine* on the north shore of the bay and reaching into the channel.

It ends opposite the inner side of the Semiah'moo Spit, and there is a large saw-mill on the inside of this wharf and inside the low water line.

Drayton Harbor was examined and named by the United States Exploring Expedition in 1841. The United States and British steamers attached to the Northwestern Boundary Commission were accustomed to anchor here (1857–'58).

A map of it was published by the U. S. Coast Survey in 1858, about the time when the town was first settled on account of the Fraser River gold excitement.

BOUNDARY BAY.

This is the northwestern part of the gulf lying between Birch Point and Point Roberts. It is reckoned to embrace the broad shoal area between Kwo-mais Point and the eastern head of Point Roberts. The latter lies six and three-fourths miles south forty-one degrees west (S. 41° W.) from the former; and to the northwest of the line joining them the bay is four and one-fourth miles deep, and there is very little more than three fathoms on the line. Half the depth of the bay is very shallow, and its northern shore is low and marshy and fringed with trees and bushes. From this north shore low land heavily forested extends northwest three miles, to Fraser River.

Point Kwo-mais is a rounding bluff point two hundred feet high and densely wooded. From it the shore runs northwest for two miles, and nearly a mile behind and northeast of the low point at this distance there is the entrance to a stream named the Nicomeckl River. From the point a channel carrying from one and a half to five fathoms of water leads through the flats to deep water.

Point Roberts.—The eastern head of Point Roberts forms the western boundary of this bay. This head is one hundred and fifty feet high, with a nearly vertical white face, and its summit is covered with trees. From it the land bordering the bay falls gradually to the northwestward.

From this head an extensive reef extends one mile nearly due east, with broken bottom marked by kelp in four to five fathoms at nearly two miles. Deep water makes well under the northeastern part of the head just north of this reef, and the surveying brig *Fauntleroy* has anchored here. But the usual anchorage is in seven or eight fathoms of water over sandy bottom when the western spit of Point Roberts is just shut in by the white cliffs of the eastern head, which will bear west-southwest, distant one and one-half miles. This anchorage is only a stopping place for sailing vessels, and they must be prepared to leave on the shortest warning if a southeaster is threatening.

The geographical position of the station of the U. S. Coast and Geodetic Survey on the top of the cliff at the eastern head of Point Roberts is:

Latitude ..... 48° 58′ 26′.5 north.
Longitude ..... 123° 01′ 28′.8 west.

This is the western part of the Ensenada del Engaño of Galiano and Valdez, 1792. It was not named by Vancouver. It was simply designated as shallow on the Admiralty chart of 1847. It was named Mud Bay on the U. S. Coast and Geodetic Survey's map of 1855, but on the recent edition it is called Boundary Bay, and the same name is used on the Admiralty chart, No. 2689.

POINT ROBERTS.

When seen from the northern entrances of the Canal de Haro and Rosario Strait this point stands out near the middle of the Gulf of Georgia as a bold, wooded island. From Alden Bank it is seen as a wooded, moderately high, and nearly flat-topped island. It is a little higher at the eastern part, under which is the bright white bluff. The height of the exposed bluff is one hundred and eighty feet.

From Tumbo Reef the point is visible as a long, low, flat, wooded island, showing the white cliff at the eastern point.

When the weather is clear the high mountains that lie just north of Burrard Inlet are seen over Point Roberts. They attain an elevation of forty-eight hundred and eighty feet and are twenty-six miles northward of Point Roberts.

From Rosario Strait the southwestern point bears nearly northwest by west three miles; west (NW. by W. ¾ W.), distant eighteen and a half miles. From Whitehorn Point it bears distant twelve and a third miles. It is the southern termination of a remarkable promontory miles wide, stretching southeastward from the mouth of Fraser River, and forms the west shore of Boundary Bay. The southern face of this promontory is two and a half miles southwest and east-northeast, with a very slight recession of the shore along this line. The eastern head of the point has already been described as a white and nearly vertical cliff hundred and fifty feet high, and covered with a dense forest of Douglas fir and other trees, greatly to its apparent height. This white cliff decreases in height for a mile to the when the shore is low to the western spit, which is a low shingle point, behind which area of level, clear land. Nearly a mile north of this low, level land the cliff of the head, which runs diagonally towards the northwest, breaks upon the western shore of Roberts, about a mile from the southwestern spit. All the higher land is covered with

In the Fraser River gold excitement of 1858 a few shanties to represent a small town built here, but the next year they were burnt down.

The geographical position of the U. S. Coast and Geodetic Survey station on the western point is:

Latitude	48° 58′ 17″.5 north
Longitude	123 04 53 .8 west

It is therefore nearly two miles south of the northwestern boundary between the United States and British Columbia.

From the western extremity of Point Roberts we have the following bearings and distances to important objects:

Birch Point, Black Buoy	N. 76	E.	10 miles
Point Whitehorn, Red Buoy	N. 89	E.	12 miles
Alden Bank, Red and Black Buoy, in three and one-half fathoms	S. 69	E.	11¼ miles
Mid-channel, north entrance of the Canal de Haro	S. 39	E.	11½ miles
Active Pass Light-house, Georgia Point, south side of entrance	S. 34	W.	10 miles
Entrance Island Light-house, approaches to Nanaimo	N. 87	W.	32 miles
Gabriola Reef, Black Buoy, on above course at			21½ miles
North Sand Head, Fraser River Light-house	N. 72	W.	99 miles

There is an open anchorage under the south face of Point Roberts where the United States Survey brig *Fauntleroy* used to anchor in ten fathoms over hard sand about three quarters of a mile eastward of the point. In strong northerly winds down the gulf the heavy short sea is broken and changed in direction by the point. At the change of currents with such a heavy swell the anchorage is very uncomfortable; but as a rule the current, even on the ebb, sets to the west. There is scant anchorage just northwest of the point in eight fathoms on a good holding-ground three-fourths of a mile from the point, close under the edge of the bank which makes out half a mile from the western shore. The range for this anchorage is Mount Constitution over the low point of Roberts, which bears southeast half east, and the cliff of the forty-ninth parallel, or the monument on its summit, bearing northeast. The bank will be only a quarter of a mile to the eastward; it is steep-to and shoals suddenly. Vessels can not lie here in any strong wind.

From the southwestern spit of Point Roberts the shore to the northward is low for a mile, then commences a bluff two and a half miles long. The general direction of this shore is west by north, and at the parallel of forty-nine degrees there is an opening through the bluff of the promontory to mark the line of the Northwest Boundary. At the western opening the bluff is one hundred and eighty feet high, and at the top in the gap there is built a granite monument.*

*The *Boundary Monuments* on Point Roberts between the United States and British Columbia are both on the forty-ninth parallel. Taken from the topographical map the monument at the eastern side of the point is one hundred and sixty yards (8″) north of latitude 49°; and the monument at the western side is two hundred and nine yards (7¾″) north of 49°. These errors are doubtless owing to the deflection of the plumb-line at the astronomical station of the Boundary Commission in Semiah'moo Bay. (1857–1858.)

twenty-five feet high, erected as the initial point of the boundary. The northwest termination of the cliff shore is known as English Bluff. Thence along the shore-line to the northern and principal mouth of the Fraser River, the direction is roughly northwest for six miles, or nine and a quarter miles from the western spit of Point Roberts. This part of the shore is low and densely wooded.

This promontory was discovered by Don Francisco Eliza in 1791, and named the Peninsula de Cépeda. It was next seen by Vancouver in June, 1792, and he named it Point Roberts. In the same year, after Vancouver, Eliza's name was retained by Galiano and Valdez. In the Admiralty charts from 1847 it is called Roberts Point.

THE ROBERTS AND STURGEON BANK, BRITISH COLUMBIA.

The great shoal bank extending from the delta of the Fraser River nearly one-third across the Gulf of Georgia is formed by the detritus brought down by the Fraser River through its several mouths. From the western extremity of Point Roberts it sweeps in a roughly semicircular arc to Point Grey at the entrance of Burrard Inlet, nineteen miles to the northwest. Through this extensive shoal two moderately deep channels cut their way for the main river and for the north fork. The principal channel is formed by the main river, and all the area from this channel to Point Roberts is now known as Roberts Bank, and that to Point Grey is the Sturgeon Bank. Vancouver gave the latter name to the whole area. A marked peculiarity of the bank is the steep-to character of its seaward edge, where it drops suddenly from two and three fathoms of water to ten and twenty even at the very mouths of the channels. Off the mouth of the main ship channel there is a depth of fifty fathoms within a mile.

From Point Roberts the general direction of the bank is west by north for nine and a half miles; then curving slightly it runs nearly north-northwest for twelve miles, to Point Grey. Off the Sturgeon Bank the depth of water is more suddenly increased than off the Roberts Bank. Under the west side of Point Roberts, we have already described the open anchorage there.

Vessels are warned to keep a vigilant lookout for this great danger when approaching it in thick and smoky weather, the more especially as the currents are quite strong and not regular towards the Point Roberts part, off which there are very heavy current rips, which become dangerous to small vessels when an adverse wind is blowing.

PILOT LAWS AND REGULATIONS FOR THE STRAIT OF FUCA, PUGET SOUND, AND ALL AMERICAN WATERS PERTAINING THERETO.

(Approved, February 2, 1888; took effect April 1, 1888.)

SEC. 11. That every pilot on boarding a vessel shall, at the request of the master, exhibit his license, and on refusal to do so, shall be liable to a penalty of fifty dollars.

SEC. 16. That it shall be the duty of every pilot in charge of a vessel arriving at any of the ports of Puget Sound or its branches, to have the vessel safely moored or anchored in such a position as the master of the vessel may direct, when his responsibility shall cease.

SEC. 18. That no person except those licensed by the commissioners shall pilot vessels in and out of the bays or harbors of Puget Sound or Juan de Fuca Strait, or to or from the Pacific Ocean through said strait for hire, under penalty of three hundred dollars fine for each and every offense. This penalty is not incurred where the master of a vessel acts as his own pilot; provided that the master or owner of any vessel shall not be compelled to take a pilot under the provisions of this act.

SEC. 20. That pilots taken to sea against their wills, when a boat is in attendance ready to receive them, shall be entitled to receive five dollars per day while absent, which sum shall be paid by the master or owner of the vessel by which the pilot was taken away.

SEC. 21. That if any pilot offers himself to any vessel requiring his services as pilot, outside of a line drawn from the west end of Waadda Island to Observatory Point on the east side of Port San Juan, British Columbia, if inward bound he shall have the preference, if a pilot's services are required by the vessel where bound to sea, or a pilot from the same pilot-boat.

SEC. 23. That the hull and appurtenances of all vessels shall be held liable for pilot's dues.

SEC. 24. That the pilots shall at all times keep a boat in good condition cruising on the Strait of Fuca or at sea. The number of pilots to be on any one boat to be determined by the commissioners.

SEC. 26. The Board of Pilot Commissioners shall fix the rates of pilotage between the open sea and the ports on Puget Sound. But such rates shall not exceed eight dollars per foot draught to vessels who engage pilots outside of Waadda Island to port of entry or other ports on Puget Sound. To vessels from British Columbia to port of entry or other ports on Puget Sound, not to exceed six dollars per foot draught. To vessels from Port Townsend to any of the ports on Puget Sound, not to exceed four dollars per foot draught: *Provided*, That nothing in this act shall be construed as requiring half pilotage to be paid when services are not actually performed: *And provided further*, That

every pilot bringing a vessel from sea shall take her to her port of destination if required when that port is above the port of entry, without additional charges. But after twenty-four hours of delay at the port of entry the pilot shall be entitled to additional pay of five dollars per day for every day so delayed.

Extracts from the by laws of the Pilot Commissioners.

SEC. 12. Pilot-boats, while cruising, must have a white signal lantern displayed in a conspicuous manner during the night, and the number of the boat displayed on the mainsail as a day signal.

SEC. 13. Neither pilots nor their boats shall be permitted to leave their peculiar service, whether in or out at sea, unless to assist vessels in distress, more than thirty miles north or south of Tatoosch light without first obtaining permission of this board, and any boat infringing this. * * *

SEC. 15. That rates of pilotage shall be as follows: Inward bound, six dollars per foot draught from any point on a line drawn from Cape Beale, British Columbia, and Flattery Rocks, Washington Territory; five dollars per foot draught from any point on a line drawn from Waadda Island to the most westerly point of San Juan Harbor, British Columbia; four dollars per foot draught from any point west of a line drawn from Port Angeles light, Washington Territory, to Race Rocks, British Columbia; three dollars per foot draught from Port Townsend to any port on Puget Sound, or *vice versa*. Any fraction of a foot over six inches, a foot; under six inches not counted. Draught to be measured when vessel draws most. Should vessel be detained in Port Townsend Harbor more than twenty-four hours before proceeding to any other port on Puget Sound, the pilot to be paid five dollars per day for every day over detention above said twenty-four hours. Outward pilotage to be five dollars per foot draught from Port Townsend to the sea, and six dollars per foot draught from any port on Puget Sound to sea. Outward-bound vessels allowed forty-eight hours detention without charge for delay.

It is reported (August 13, 1889) that these laws and regulations are a dead letter, because no persons have qualified under the law which does not allow half pilotage when vessels decline a pilot. The Victoria pilots at present do all the piloting.

VANCOUVER ISLAND AND BURRARD INLET.

Coal and lumber ports.

Pilotage.—Pilotage is compulsory. The rate is four dollars per foot of draught, and half rates are compulsory if no pilot is employed.

Tonnage.—In 1886, the Puget Sound tugs adopted a schedule of rates for towing vessels from sea, and from Race Rocks or Port Angeles to the coal and lumber ports, but the rates are not adhered to.

BRITISH COLUMBIA.

The southern part of this territory was named New Georgia by Vancouver in 1792. It received its present name by decree of the British Government in 1858.

FRASER RIVER.

This is one of the few great rivers on the northwest coast of America; "and in point of magnitude and present commercial importance, it is second only to the Columbia." (Vancouver Island Pilot.)

The river has its rise in the Rocky Mountains, nearly five hundred miles from its mouth, and runs in a general southerly direction, receiving many tributaries. It passes through valleys confined by gigantic mountains; with large tracts of country, rich in agricultural resources, on either side of them. It becomes a navigable stream eighty miles easterly from its mouth, at the town of Hope; fifty miles above Hope it receives the Thompson River. Steam-boats of light draught reach Hope, and even Yale, which is fifteen miles farther up the river, for six or nine months of the year. With the melting of the snows, the stream becomes almost a great torrent, with the current running from four to seven knots an hour to within fifty miles of the mouth, to which point at the town of Langley vessels drawing eighteen feet of water may be taken with steam power. Within twelve to fifteen miles from the mouth in a direct line, the hills have decreased to three hundred and two hundred and fifty feet in height; and thence to the gulf-shore the land is low. When the main stream reaches the coast it opens by several channels, but the deepest lies between *Pelly Point* on the south and *Garry Point* on the north side of the mouth. The channel is close under the latter point, where a depth of sixty feet may be found. Thence it cuts its way in a south-southwest direction through five miles of the Sturgeon Bank, to the Gulf of Georgia. At the mouth on the gulf navigation has the advantage of an entrance not obstructed by a breaking bar as would be if it were exposed to the ocean swell and winds. For more details about the river see the Vancouver Island Pilot.

At the entrance to the river on the main land, the north shore is known as Garry Point. The shores and the land back are low and covered with a growth of alders, willows, and trees indigenous to the low, marshy soils. The channel under this point is nearly half a mile wide. The shore-line inside is low and continuous, but the steep clay banks are flooded at the high tides. The southern side of the entrance is Pelly Point, formed by several low islands with narrow channels between them and a broad low-water mud beach towards the channel under Garry Point. When at the entrance a remarkable solitary bushy tree is seen on Garry Point. It bears from the Sand Head a little east of north-northeast, and is just five miles distant. There is always a quantity of driftwood on this point.

The *North Sand Head* is the north point of the bank at the entrance into the Gulf of Georgia. It is now marked by the Light-house. The South Sand Head is the southern point of the entrance into the gulf and the channel-way between the three fathom curves is about one-third of a mile wide. A Light-ship was formerly moored off this head, but it has been removed. Inside of the outermost points of these two sand heads there is a depth of water of over twenty fathoms, so that the change from deep water to shoal water is very sudden. The South Sand Head dries before low water, and there is frequently a ripple over it when it is under water.

The channel through this bank to Garry Point is well marked by ten buoys. But the Vancouver Island Pilot advises "*strangers not to enter without a pilot*, and certainly not under any circumstances unless the buoys are in their places between the entrance shoals; any further detailed directions would be practically useless; a pilot, the chart, or local knowledge is absolutely necessary."

It should be remembered that the ebb current from the river sets to the southeastward over Roberts Bank, and the flood current tends to the northwestward over the Sturgeon Bank.

A vessel drawing from fifteen to sixteen feet of water may enter the river with safety at half tide.

Vessels approaching the entrance at North Sand Head from the direction of Point Roberts avoid Roberts Bank by keeping the westernmost part of the point bearing east.

LIGHT-HOUSE AT FRASER RIVER ENTRANCE.

The early difficulty of making the mouth of the channel so far out from the shore had been obviated by the establishment of a Light ship off the entrance, but this has been improved upon by the building of a Light house on the North Sand Head. This structure is erected on the north side of the river nearly one mile inside the entrance, and abreast of it the channel carries two fathoms of water.

The building consists of a hexagonal wooden tower painted white and forty-nine feet high from its base to the vane on the lantern. It is supported above the water on an iron pile foundation. The illuminating apparatus is of the third order dioptric, and shows from sunset to sunrise a *fixed white light* throughout the entire horizon. It was first exhibited May 1, 1884. The focal plane is fifty two feet above the high water level of the sea. Under ordinary conditions of the weather it should be visible from a vessel's deck at a distance of twelve miles, and is therefore seen from the south and western coast, from the Active and Portier Passes, and to the southward of Point Roberts.

The light therefore serves as a general coast light as well as the guide to the entrance of the channel between the Sand Heads.

A *fog-bell* is attached to the Light-house building, and is sounded during thick and foggy weather night and day.

The approximate geographical position of the Light-house is:

Latitude	49	04′ 54″	north
Longitude	123	16′ 06″	west.
Or, in time	8h	13m 04s.4	

In January, 1885, the magnetic variation was 23° 55′ east.

From this Light-house we have the bearings and distances to important objects:

Point Roberts, western extremity, low	S. 72° E.	9½ miles.
East Point, Saturna Island	S. 51° E.	20 miles
Active Pass Light-house, Georgina Point, south side of entrance	S. 20° E.	12¼ miles.
Portier Pass, between Galiano and Valdez Islands	S. 49° W.	12¼ miles.
Gabriola Reefs, Black Buoy	S. 84° W.	15½ miles
Entrance Island Light-house, approaches to Nanaimo	N. 87° W.	22½ miles
This line passes two-thirds of a mile north of Gabriola Reefs, at		15½ miles
Point Atkinson Light-house, Burrard Inlet	N. 22° W.	15 miles
Point Grey, on the same course, at		11 miles

This river was discovered by Eliza in 1791, and considered a ramification of the Entrada de Florida Blanca or Burrard Inlet. It was passed by Vancouver in 1792, but seen by Galiano and Valdez soon afterwards. Mackenzie examined its headquarters in 1793. And in 1808 Simon Fraser, an agent of the Hudson Bay Company, traced it nearly down to its mouth; and from this exploration the present name has been derived.

Tides, Fraser River Entrance.—The time and height of every tide throughout the year may be obtained from Tide Tables for the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

BURRARD INLET, BRITISH COLUMBIA.

This extensive bay and fine harbor has acquired a large importance within the last ten or twelve years by the establishment of the western terminus of the Canadian Pacific Railroad upon its shores. It is the first great harbor which breaks the continental shores of British Columbia south of the forty-ninth parallel. The entrance is just three miles wide between Point Grey on the south-southeast and Point Atkinson on the north-northwest. East and west the length is four miles to the first narrows in the northeast angle of the bay, whence there is a long inlet one to two miles wide and running east-southeast for twelve or fifteen miles. In the eastern prolongation of this

inlet is Coal Harbor, above the first narrows and under the south shore; Moodyville is on the north shore before reaching the second narrows; and Port Moody is at the head of the eastern arm of the inlet. The north shore of the inlet has deep water close under the northern shore-line. The south and lower shore off Point Grey has shoal water two-thirds of a mile wide out to the three-fathom curve; it is known as Spanish Flat. The fifty-fathom curve enters the bay and the deepest channel runs under the north shore to the first narrows; east of the Spanish Flat the water shoals to ten and six fathoms of water over what is known as English Bay. In the southeast part of the bay there is a shoal-water slough leading several miles to the eastward. But the *town of Vancouver* is located on the low shore about three and a half miles inside Point Grey and five miles east-southeast from Point Atkinson Light house, where the anchorage is good and several square miles in extent.

The entrance to the inlet is naturally well marked. Point Grey is a broad and long wooded promontory terminating in a rounded bluff, and is quite conspicuous from the southward. West-southwest four miles from Point Atkinson is the southeast point of Bowen Island, which lies at the entrance to Howe Sound. "This is a very remarkable island. Its high, round, and almost bare summit, Mount Gardner, reaches an elevation of two thousand four hundred and seventy-nine feet, and is easily recognized from every point of view in the gulf." (Vancouver Island Pilot.)

Between Bowen Island and Point Atkinson, and directly in the middle of the entrance to Howe Sound, is the small but prominent islet called Passage Island.

Burrard Inlet is very easy of access for vessels of every class. Over the southeastern half good anchorage may be had inside of twenty fathoms of water. Vessels must not approach Point Grey nearer than three-quarters of a mile on account of Spanish Flat. This bank is hard sand and is dry a long way out at low water. Its northern edge is steep-to with a drop to seven and twenty fathoms. At high water the existence of this flat would not be suspected, as there is no ripple on it, unless with strong westerly winds, and then only near low water. It serves to further protect the anchorage off Vancouver, where there is capital anchorage in six and seven fathoms of water. Spring tides rise and fall as much as sixteen feet.

Buoy off the Spanish Bank.—Just off the outer edge of the Spanish Bank toward Bowen Island, an *Iron Can-buoy, surmounted by a staff and cage*, the whole painted *red*, has been moored in ten fathoms of water at the southern side of the entrance to Burrard Inlet.

From the buoy the following bearings and distances are given to prominent objects: The bluff at the entrance to the First Narrows inside Burrard Inlet, northeast one-quarter east (NE. ¼ E.), distance four and five-sixths miles; Point Atkinson Light house, north-northwest (NNW.), distance two and four-fifths miles; Point Grey, south-southeast (SSE.), distance one and a quarter miles.

The geographical position, as given by the Department of Marine at Ottawa, is:

Latitude	49° 17′ 14″ north.
Longitude	123° 15′ 08″ west.

It was first published February 7, 1888.

When Vancouver was approaching Point Atkinson he says: "On the northern side [of Burrard Canal] the rugged snowy barrier [of the Cascade Range], whose base we had now nearly approached, rose very abruptly, and was only protected from the wash of the sea by a very narrow border of low land," but on his chart he places the range in its proper place, well back from the shores of this inlet.

LIGHT-HOUSE ON POINT ATKINSON.

This light has been established for coast purposes and to mark the approaches and entrances to Burrard Inlet. The structures for this light have been erected on Point Atkinson, which forms the northwesterly entrance to Burrard Inlet and English Bay. The building is a square tower standing seventy feet above the water. It is forty-nine feet from the base to the center of the light, and is painted white. There is a keeper's dwelling, also painted white, attached to the tower.

The illuminating apparatus is catoptric and shows from the west by south three-fourths south along the south face of Bowen Island round by the south into Burrard Inlet. It was first exhibited May 1, 1875, and from sunset to sunrise it is a *revolving white light showing at intervals of one minute* and making a complete revolution in two minutes. [The "order" is not specified in the official announcement.

The focal plane is elevated one hundred and nineteen feet above the level of high water, and under favorable conditions of the atmosphere it should be visible at a distance of fourteen or fifteen miles.

When the light bears north half west the western edge of the Sturgeon Bank is just cleared; therefore the light should not be brought to bear to the westward of that bearing by vessels in the Gulf of Georgia, as this bearing will only lead clear of Sturgeon Bank, off Fraser River.

The geographical position of the light is given by the U. S. Coast and Geodetic Survey:

Latitude	49° 10′ 48″	north.
Longitude	123° 15′ 41″	west.
Or, in time	8h 13m 02s.7	

In January, 1885, the magnetic variation was 23° 10′ east, with an annual decrease of 9′.

From Point Atkinson Light we have bearings and distances to the following important points:

Point Grey, southwest point Burrard Inlet	S. 22½	E.	4 miles
North Sand Head Light-house, Fraser River	S. 22½	E.	15 miles
Active Pass Light-house, Georgina Point	S. 21	E.	27½ miles
Portier Pass, between Galiano and Valdez Islands	S. 11	W.	23½ miles
Gabriola Reef, Black Buoy	S. 31½	W.	18½ miles.
Entrance Island Light-house, approaches to Nanaimo	S. 48	W.	32½ miles
Cape Roger Curtis, southwest point of Bowen Island	S. 67	W.	7½ miles

Burrard Inlet was the limit of Eliza's exploration in 1791. He named it the Canal de Sasamal. It was named Burrard Canal by Vancouver in June, 1792. Point Atkinson was named by Vancouver. For the tides of Burrard Inlet consult Tide Tables for the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

ACTIVE PASS, BRITISH COLUMBIA.

This channel is one of those used by vessels bound to and from the Gulf of Georgia from Victoria and Esquimalt, instead of the Canal de Haro. From Discovery Island the course is open and direct through the southern part of the Canal de Haro for eighteen miles, then through the Swanson Channel, between Moresby and Pender Islands and Prevost and Mayne Islands, nine miles; finally through the crooked and half-mile wide Active Pass, three and a half miles between Mayne Island and Galiano Island. If bound to Fraser River the distance across the Gulf of Georgia is eleven miles. This gives a total of forty-one and a half miles, as against forty and two thirds miles by the Canal de Haro. The currents run through the pass with great velocity, and are irregular, yet vessels may safely go through with the current; but in passing through against the current a vessel may take a dangerous sheer from undercurrents or from unexpected swirls. There is one very sharp turn in the pass.

For the approaches to this pass, consult the charts and the Vancouver Island Pilot.

THE ACTIVE PASS LIGHT-HOUSE.

The Gulf of Georgia entrance to this pass has been marked by a Light-house on the southern and eastern point. This point is rocky and low, being not over twenty feet above the water, but the land behind it to the southeast rises to a hill six hundred feet high within one mile. The island is covered with forest trees.

The building is a wooden square tower painted white, and rising forty-two feet from the ground to the vane on the lantern. There is a keeper's dwelling attached.

The illuminating apparatus is dioptric of the sixth order, and shows a *fixed white light* over an arc from east half north over the Gulf of Georgia and through the west in the Active Pass round to southwest half south. The light was first exhibited on the 10th of June, 1885, and shows from sunset to sunrise. The focal plane is fifty-five feet above the level of high water, and under favorable conditions of the atmosphere should be visible at the distance of twelve miles. The light serves as a coast light as well as for the pass; it will therefore be seen from the south entrance of the Canal de Haro, the eastern head of Point Roberts, North Sand Head Light-house, and within two miles of the Portier Pass.

The geographical position of the Light-house is:

Latitude	48° 52′ 27″ north.
Longitude	123° 17′ 19″ west.
Or, in time	8h 13m 09s.3.

This pass was discovered and made public by the U. S. Coast Survey in 1858, although it had doubtless been previously known to the Hudson Bay Company. It received its present name from the surveying steamer that first passed through; but for some time the English authorities affected the name Plumper.

ACTIVE PASS, DAY BEACON.

A *day beacon* has been erected on the Enterprise Reef off the western entrance to the Active Pass from the Swanson and Trincomalie Channels.

The *Enterprise Reef* is formed by two rocky patches about two hundred yards apart northeast by east and southwest by west. The westernmost rock is bare at low water, and both are marked by kelp. There is a passage inside the eastern sunken rock. The western one has very deep water on the western side. It lies two thirds of a mile south by east from the extremity of Helen Point, which forms the southern rocky point of the western entrance to the Active Pass.

The western rock uncovers about one and a half feet at low-water spring-tides, and the beacon is placed near its western extremity. The beacon is made of wood on an iron pile foundation. The three iron piles extend upward from the rock to two and a half feet above high water mark. The superstructure is nineteen feet high, making the whole beacon thirty-four feet high from the rock and showing a clear twenty two feet above high water. To the pyramidal framework of the beacon are fixed two disks made of slats at right angles to each other, having the appearance at a distance of upper and lower balls. The whole of the superstructure above water is whitewashed.

The geographical position of the beacon is:

Latitude	48° 50′ 50″ north.
Longitude	123° 21′ 20″ west.

ACTIVE PASS, FOG-SIGNAL.

The Government of Canada has established a fog signal at the Light-house station on Georgina Point on the south point of the eastern entrance to Active Pass from the Gulf of Georgia.

The belfry is a square wooden building painted white and located on the extreme westerly part of the point, about forty feet from the Light house. The bell is hung in an open part of the belfry facing seaward, and is about thirty feet above high-water mark. It is operated by machinery, and in thick and foggy weather it will be sounded by *one stroke every fifteen* seconds.

It was established October, 1887.

PORTIER PASS.

This is the first passage northwest of the Active Pass from the interior channels under the Vancouver shore to the Gulf of Georgia. The gulf entrance is fourteen and a third miles west half north from Active Pass Light, this course passing along the nearly straight shore of Galiano Island, off which the water is deep and without known sunken dangers. It separates the northwest end of Galiano Island from the southeast end of Valdez Island. The pass is straight and nearly a mile long, north-northeast and south-southwest, with Reid Island facing it on the southwest. It is comparatively narrow, and has dangerous sunken rocks off the south point of Valdez Island and off the north point of Galiano Island. The currents are very strong, running from four to seven miles an hour with overfalls and whirling eddies at all times in the northern entrance. No vessel except a fast steamer should use it unless in an emergency.

For details of the dangers, tides, and currents, see the Vancouver Island Pilot.

From the eastern entrance to Portier Pass we have the bearings and distances to important objects in the Gulf of Georgia, as follows:

Active Pass Light-house	S. 76° E.	8⅝ miles.
North Sand Head Light-house	N. 49° E.	22¾ miles.
Point Atkinson Light-house, Burrard Inlet	N. 11° E.	12¾ miles.
Gabriola Reefs Black Buoy	N. 41° W.	14½ miles.

GABRIOLA REEFS AND BUOY.

Lying two miles out into the Gulf of Georgia from the islets off the eastern part of Gabriola Island there is a large of dangers embracing sunken rocks and some which cover at half flood. The reef is one and a half miles long, north and south, and is about one-fourth of a mile wide. Inside of it there is a deep passage half a mile wide, but it should be avoided.

The north end of the reef is marked by a *black buoy*, outside of which the bottom drops away very suddenly to a very great depth. This buoy lies one and a half miles east-northeast from the nearest of the Flat Top Islands.

From it we have the bearings and distances to important objects:

Entrance Island Light-house, approaches to Nanaimo	N. 87 W.	7½ miles.
Point Atkinson Light-house, Burrard Inlet	N. 32 E.	18¼ miles
North Sand Head Light-house	N. 84 E.	15¼ miles
Mid-channel of north entrance to Canal de Haro	S. 73 E.	33¼ miles
Active Pass Light-house	S. 63 E.	22 miles.

NANAIMO HARBOR.

This bay lies on the eastern main shore of Vancouver Island at the northwestern end of the channels leading from the Canal de Haro, parallel with the main shore; and it is reached by these channels or by the route through the Gulf of Georgia and outside the islands.

We refer more especially to it because it is here that large supplies of coal for the Pacific Coast are obtained and used by all the vessels of these waters. Large quantities are also exported. At present it is the best coal on this part of the coast.

In reaching the harbor from the Gulf of Georgia the approaches are seven and a half miles to the northeast of the bay. The turning point is at the Entrance Island Light-house, whence broad, open bay stretches to the southwest and around the northwest end of Gratiola Island to the east-southeast. The bay itself is comparatively small, although at high water the extensive flats to the southeast give it the appearance of a large bay. Protection and Newcastle Islands, lying a mile off the main shore, form the bay, in which there is limited anchorage in from seven fathoms of water. The bottom is uneven; some sunken rocks occur, and the anchorage near the rivers is so contracted that vessels must moor.

There are buoys to mark the approaches, and full details are given in the Vancouver Island Pilot.

Pilots are to be found here to take vessels in.

The distance of the bay from Entrance Light-house is five and a half miles, and the general direction southwest.

NANAIMO ENTRANCE ISLAND LIGHT-HOUSE—APPROACHES TO NANAIMO HARBOR, VANCOUVER ISLAND.

This light has been established to indicate the entrances of Nanaimo Harbor and Departure Bay, and for the general purposes of navigation. It is placed upon the small, low island which is thirty feet high, lying a little more than half a mile north-northeast from Ferry Point, the southernmost extremity of Gabriola Island. The structure is a square wooden tower painted white, and fifty feet high from the base to the vane on the lantern: there is a keeper's dwelling also attached.

The illuminating apparatus is catoptric, and the focal plane is sixty-five feet above the mean high water. It was first exhibited on the 8th of June, 1876, and shows from sunset to sunrise a *fixed white light*, which should be seen at a distance of fourteen miles under favorable conditions of the atmosphere.

The geographical position of the Light-house, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	49	12	46	north
Longitude	123	48	19	west
Or, in time	8h	15m	17s	

From this Light-house we have the bearings and distances to the following important objects:

Point Atkinson Light-house, Burrard Inlet	N. 48 E.	22 miles
North Sand Head Light-house, Fraser River	N. 87 E.	29 miles
Gabriola Reefs Black Buoy	S. 87 E.	7¼ miles
Northwest Point of Gabriola Island	SW. ¼ W.	2¾ miles

The usual spelling of the name is Nanaimo, but that best representing the Indian sounds is Nah-yu' moh.

For the tides at Nanaimo Harbor, consult Tide Tables of the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

FAIRWAY CHANNEL, BELL-BUOY.

A *Bell-buoy* has been placed in the Fairway Channel to Departure Bay and Nanaimo Harbor. It is three miles southwest by west half west (SW. by W. ½ W.) from Entrance Island Light-house, and three quarters of a mile southeast by east half east (SE. by E. ½ E.) from the south end of Light-house Island.

The depth of water was not given in the printed notice to mariners, but the above bearings locate the buoy near mid-channel, where there is a depth of fourteen fathoms.

Fairway Channel.—A *third-class black can-buoy* has been moored in three and a half fathoms of water on the tail of the shoal stretching from the southern point of Light-house Island into the Fairway Channel between that Island and the north end of Gabriola Island. It is four cables southeast by east half east (SE. by E. ½ E.) from Light-house Island.

A *third-class black can buoy* has been placed off the extreme east point of Jessie Island at the north side of the entrance to Departure Bay. It is moored in seven and a half fathoms of water one and a quarter cables eastward of the island.

A *third-class red can buoy* has been moored in three and a half fathoms of water on the shoal making out from the north shore of Departure Bay towards the Black Islands, where the channel is very narrow.

A *third class black can buoy* has been moored in three and a half fathoms of water off the foul ground making out from Horswell Bluff at the northeast point of Departure Bay. The buoy lies one and two-thirds cables from the shore.

Inner Channel.—A *third class black can-buoy* has been moored on the east side of the Clarke Rocks, which lie on the western side of the inner channel between the Clarke Rocks and the West Rocks. No depth is given. This channel is the nearest to the shore and leads into Departure Bay from the northward.

(November 23, 1888.—"It will be noticed that the coloring is not in accordance with the Rules, and they will probably remain so until larger ones replace them.")

Sailing vessels navigating the western shores of the Gulf of Georgia in clear weather have no trouble if there is plenty of wind; but they must avoid getting too close to the shores, where the currents rush past its precipitous cliffs with great velocity.

In 1858, while surveying in this vicinity, the Coast Survey Brig *Fauntleroy* with thirty eight fathoms of chain at her bows, drifted in a calm dangerously close along the shore for several miles and within eighty yards of the rocky cliffs before the anchor brought upon the bottom. In one or two instances during this drift the lead would indicate bottom in ten fathoms and the next cast would give a depth of forty or fifty fathoms.

ADMIRALTY INLET, PUGET SOUND, AND HOOD'S CANAL.

GENERAL DESCRIPTION.

Under special names the great body of water now known to the commercial world under the general designation of "Puget Sound" may be described as a series of vast interior canals giving unsurpassed facilities for navigation in the very heart of a prosperous section of the country, and having broad and free communication with the ocean, and with British Columbia and Alaska through their similar systems of interior channels.

"Puget Sound," in the broad acceptation of the term, lies between latitudes 47° 03′ and 48° 11′; and between longitudes 122° 10′ and 123° 10′.

Admiralty Inlet, Hood's Canal, and Puget Sound, have an aggregate shore-line of not less than nine hundred and eight statute miles, and Possession Sound two hundred miles, yet the number of dangers known to exist in them is remarkably few.

One of the inlets or arms of Puget Sound reaches within two miles of the head of Hood's Canal, and between these heads lies a large lake. The southern waters of this sound are also within sixty-five miles, in a direct line, of the Columbia River, at the mouth of the Cowlitz, which is fifty-two miles from Cape Disappointment, and within five miles of the headwaters of the Chehalis River, which runs into Gray's Bay.

Between these waters and the ocean to the westward lie the great masses of the Olympus Range, which has its southern flank in the latitude of 47° 10′. To the eastward of the Sound is the rolling, wooded country lying under the western flank of the Cascade Range. Just inside the

eastern shores are the extensive deposits of coal. The whole region to the mountains on either side is covered with a dense growth of the "Oregon pine," which is cut into lumber and shipped to all parts of the world in marvelous quantities.

The connection of the waters of this sound with the ocean is directly through the Fuca Strait, eighty miles in length from the entrance to Admiralty Inlet.

But these waters have a still wider and more important relation with the countries to the northwest, in being the southern limit of a series of great straits or interior canals reaching to the northwest as far as the parallel of fifty-nine degrees. These straits pass between the continental shores and Vancouver Island, thence through deep and broad channels protected from the ocean swell to the southern boundary of Alaska, and thence to the head of Chatham Strait. These great channels of ship communication lie generally parallel with the island outer coast and the continental shores. Only in crossing Queen Charlotte Sound, Milbank Sound, and Dixon Entrance is a vessel in sight of the Pacific Ocean, and then but for a few miles. These straits being well in from the ocean are much less subject to fogs than the ocean coast.

Every square mile of the lands bordering these straits is covered with forest trees wherever the shores are not too precipitous; and it is highly probable that there is untold mineral wealth throughout the regions traversed.

ADMIRALTY INLET.

This great strait commences at the southeastern extremity of the Strait of Fuca between Point Partridge and Point Wilson, both already described. From the entrance it runs in a general southeast by east direction for twenty two miles to between Skagit Head and Point No Point, and then in a general southern direction for thirty-six miles, to the south end of Vashon Island. For this whole length it has an average breadth of three and a half miles; and numerous broad branches from it on both sides form other straits, channels, bays, and harbors.

At sixteen miles from the entrance to the inlet a great arm, called Hood's Canal, opens on the western side, and runs sixty miles south by west, with an average width of one and a half miles. Twenty-five miles from the entrance of the inlet another arm opens on the eastern side, runs north and northwest behind Whidbey Island, forming Possession Sound, Ports Gardner and Susan, etc., and leads on to the Strait of Fuca through Deception Pass, at the north end of Whidbey Island.

At the south end of Vashon Island the Puget Sound of Vancouver commences; the channels are decreased in width to one or two miles, but they ramify by eight principal arms through an area of twenty-two miles square. The extreme northwestern arm named Case's Inlet reaches within two miles of the head of Hood's Canal, and between them lies comparatively low ground and a large lake.

The shores are generally steep cliffs, ranging from fifty to five hundred feet in height, with their faces kept bright by the gradual wearing action of the water, and their tops covered with trees and thick undergrowth to their very edges. There is so much sameness in the shores that it requires some acquaintance with the different points to recognize them by their trifling peculiarities. The depth of water in the channels is remarkably great; it reaches one hundred and nine fathoms, and perhaps averages one hundred; and it is sometimes difficult to find anchorage sufficiently far from the shore to afford room for getting under way with a large sail vessel.

Many superior harbors are found in every direction, and besides the usual settlements of a new country, thriving towns have sprung up with the development of coal mines, shipping, and the enormous lumber interests. The transcontinental railroad has its terminus at Tacoma with extensions to Seattle and Olympia, and prospective extension to Port Townsend. The importance of these developments and the close relations with the waters of the Columbia River, Gray's Harbor, and Shoalwater Bay, British Columbia, and Alaska, must be manifest and have deeply impressed us since our first explorations in these waters in 1852.

In traversing these waters by steamer or sailing vessel the great snow-covered mountain masses of the Olympus Range, rising to more than eight thousand feet, are very conspicuous objects in Hood's Canal they almost overhang its western shore. The snow peaks of Mount Baker,* to the north, and of Mount Rainier,† to the east, rising thousands of feet above the general crest line

* The Montaña del Carmelo of Galiano and Valdez.

† Locally known as Mount Tacoma. The Indian name is Taghoma.

of the Cascade Mountains, are impressive features. The former mountain, occasionally in visible activity, is ten thousand seven hundred and ninety feet high, and the latter mountain is fourteen thousand four hundred and forty-four feet.

Admiralty Inlet was discovered by Quimper in 1790 from his anchorage in Port Discovery, and called the Canal de Caamano. It was thoroughly explored by Vancouver in 1792. In 1841 it was examined by the United States Exploring Expedition in greater detail. The first work of the U. S. Coast Survey was in 1852.

ADMIRALTY HEAD.

A vessel going into the sound from the Strait of Fuca, when off New Dungeness Light-house, sees ahead the high, bright cliffs between Port Discovery and Port Townsend, and the broad side of Whidbey Island beyond. There is little or no sign of a passage in that direction, but when she is eight or ten miles eastward of New Dungeness the entrance to Admiralty Inlet opens; the high point to the northward, crested with trees, is Partridge Point, the low point with a cluster of white buildings to the south is Point Wilson; and directly ahead is a comparatively low, treeless headland standing out fairly well to the westward, with low land and water directly behind it, but the higher wooded lands beyond.

This headland is Admiralty Head; it lies five and a half miles east-southeast from Point Partridge and just inside the entrance to the inlet or sound on the eastern shore; and it is directly opposite the entrance to Port Townsend. It is a nearly vertical, rocky cliff, eighty feet high, standing well out at the extremity of the broadly triangular point. The area of the summit is limited, and marked by the cluster of white Light-house buildings; it falls away to the north to low marshy ground and a large lagoon. Towards the west-northwest the shore, alternately cliffs and low, runs nearly straight for five and a half miles to Point Partridge. Inside of it the low pebbly beach at its base sweeps to the northeast for two miles, gradually curving eastward and finally southeast to form *Admiralty Bay*. Behind this beach for two miles from the head is a large lagoon more than half a mile wide; behind that the land rises and is wooded. Admiralty Bay is formed by a great sweep of the shore-line forming a semi-circle, with a diameter of more than three miles. It is only used occasionally for anchorage just to the east-northeast of the Light-house, where the bottom is hard and sandy in irregular ridges, and with depths of fifteen to twenty-five fathoms of water. It is an uncomfortable anchorage, for it is open to the full sweep of the southeasters; and at all times the current is running out. This current is so strong that even in the summer winds a vessel rides to it. With the wind from the southward she lies in the trough of the sea.

Sailing vessels do not approach this head or Admiralty Bay, because in calm weather they encounter the strong and irregular currents near it, or they may be embayed under the eastern shore

THE LIGHT-HOUSE ON ADMIRALTY HEAD.

This is a secondary sea-coast light. The structure consists of a keeper's dwelling, with a low square wooden tower rising through the roof at the south end; the tower and dwelling are painted white, and the iron lantern surmounting the tower is painted black. The height of the tower from the base to the focal plane is forty-one feet.

The illuminating apparatus is of the fourth order of the system of Fresnel, and shows a *fixed white light*. It was first exhibited January 20, 1861, and shows from sunset to sunrise. The elevation of the focal plane above the mean level of the sea is one hundred and eight feet, and under a favorable state of the atmosphere it should be seen from a height of—

10 feet at a distance of 15.6 miles.
20 feet at a distance of 17.1 miles.

The geographical position of the Light-house, as determined by the U. S. Coast Survey, is:

Latitude	48° 09′ 19″.6 north.
Longitude	122° 40′ 34″.0 west.
Or, in time	8h 10m 42s.3.

In January, 1885, the magnetic variation was 22° 35′ east, and the present yearly decrease is 0′.6. The maximum variation was reached about ten years since.

This light illuminates an arc of two hundred and seventy degrees of the horizon, and commands Admiralty Inlet and the approaches, and looks directly up the sound and into Hood's

Canal. It sees New Dungeness Light house, but Smith's Island Light-house is hidden by Point Partridge.

From this Light-house we have the bearings and distances to important objects:

Partridge Bank Black Buoy	N. 70°	W.	8¼ miles.
Point Partridge Red Buoy	N. 68	W.	6¼ miles.
New Dungeness Light-house	S. 72	W.	16¾ miles.
Point Wilson Light-house	S. 57	W.	3½ miles.
Red Stake Light on Point Marrowstone	S. 14	W.	3¾ miles.
Foulweather Bluff Black Buoy	S. 36	E.	12¼ miles.
Point No Point Light-house	S. 46	E.	15½ miles.
And this course passes over Bush Point at			8 miles.

Admiralty Head is laid down with little prominence on Vancouver's chart. It was named Red Bluff by the United States Exploring Expedition in 1841, but it has now no color to suggest the appellation. It is now known to navigators in these waters as Admiralty Head.

Between Admiralty Head and Point Partridge there is a slight receding of the shore to the northward, and at two and two-thirds miles from the Light-house there is a breaking down of the cliff to a low sag in the land, which is free from woods for a mile. This is known as *Chief's Landing*, and a boat can land on the beach in ordinary weather. Small schooners can anchor off this landing in ten to fifteen fathoms of water one-third of a mile from the shore; but the bottom drops off suddenly to thirty and forty fathoms in a little over half a mile.

PORT TOWNSEND.

This capacious and beautiful harbor is very favorably situated at the southeastern termination of the Strait of Fuca, at the outlet of the waters of Admiralty Inlet, Puget Sound, etc., and in proximity to the great labyrinth of inland waters thence through British Columbia to the latitude of fifty nine degrees in Alaska.

It lies well protected just inside the entrance to Admiralty Inlet, now almost universally known as "Puget Sound;" the points of the entrance to the sound, Point Partridge and Point Wilson, have already been described. See pages 536, 538.

The point on the opposite side of the inlet and directly facing into Port Townsend is Admiralty Head bearing north fifty seven degrees east (N. 57° E.), distant three and a third miles from Point Wilson. From Marrowstone Point it bears north fourteen degrees west (N. 14° W.), distant three miles. The latter point is described on page 593.

The entrance to the harbor itself lies between Point Wilson* and Marrowstone Point, the latter bearing south seventy degrees east (S. 70° E.), distant three and five-eighths miles from the former. Inside of the line between Point Wilson and Marrowstone Point the width of the Port is contracted by Point Hudson, which lies south thirty degrees east (S. 30° E.) one and five-eighths miles from Point Wilson, and south eighty seven degrees west (S. 87° W.) two and five-eighths miles from the eastern extremity of Marrowstone Point. From the entrance line the general direction of the port is nearly south southwest for three miles, with an average width of one mile, to abreast the most westerly indentation, and then southeast half south for three and a half miles, with an average width of one and a quarter miles.

The shores of the port are moderately high bright cliffs with some breakdowns. The summits are covered with forest trees, except near the town.

Point Hudson† is a broad, low gravel spit, stretching out a quarter of a mile from the front of the town of Port Townsend. Part of the town is built on this low point, and the custom-house is situated but a short distance from the wharves. A large saw-mill is on the end of the point; extensive wharves project from the front of the town into deep water, where vessels readily and safely made. A quarter of a mile off these wharves there is a deep channel with ten to sixteen fathoms of water, through which the currents run with considerable force. On the north side of the point the three-fathom line extends out over half a mile for half a mile to the northwest.

Within recent years a shoal has made out two hundred and fifty to three hundred yards north of Point Hudson.

*Named by Vancouver in 1792. On one edition of the maps of the United States Exploring Expedition this point is called Point Carroll; and on another, Point Ringgold.

†Named by the United States Exploring Expedition, 1841.

POINT HUDSON LIGHT.

A *fixed red light*, lens lantern, has been suspended from an arm on a white post. The post is twelve feet high, and the light is about twelve feet above sea level. It is situated about five yards inside the high-water end of the point, and Point Wilson Light-house bears northwest three-quarters north (NW. ¾ N.), distant not quite one and three-quarters miles. It was established December 17, 1887.

Point Hudson Buoy.—To mark the outer edge of the shoal which makes out north-northwest from the extremity of Point Hudson, a *red spar buoy* forty feet long and numbered 2 has been placed in twenty-four feet of water. It is about two hundred and fifty yards north-northeast from the high water end of Point Hudson. Point Wilson Light-house bears from it northwest three-quarters north (NW. ¾ N.), distant a little more than one and three-eighths miles.

Between Point Wilson and Point Hudson there is a deep bight, the bluff shore receding half a mile westward, and carrying deep water for more than a quarter of a mile inside the line of the points, except near Point Hudson. The northwest head of Marrowstone Island, on the eastern side of the bay, is a high, bright clay cliff, terminating at the northeast in the low Marrowstone Point, and on the southwest in a low, narrow sand spit, one mile long, masking the entrance to Kilisut Inlet. This spit runs nearly south-southwest.

Parallel with this part of the port, and under the southwest point, there is an opening and a channel through shoals into Kilisut or Long Harbor, on which lies the western shore of Marrowstone Island. At high water this harbor communicates by a crooked boat channel, six miles long, with Oak Cove at the southward.

On the northwest shore of Port Townsend there are two lines of low beach, each three-fourths to one-half a mile in extent, with a high, steep, bright cliff between them.

The abandoned military post on the cliff, two and a half miles south-southwest from the town, commands one of the most beautiful views in all these waters—having the cliffs and varied shores of the bay on either hand; Admiralty Head, six miles distant; in the middle distance, several moderately high wooded ridges; and in the background, the snow-covered double summit of Mount Baker, ten thousand seven hundred and ninety feet high. The mouth of the crater is distinctly visible on the side of the main peak, and at times emits vast volumes of smoke. Mount Baker rises from and above the dark and rocky crest-line of the Cascade Range, and the line of perpetual snow on its western flank is five thousand three hundred and forty-two feet.

Kala Point, on the west side of the bay, and within one and three-fourths miles of the head, is a low point projecting a quarter of a mile from the steep, high hill side out into very deep water; it lies south by east (S. by E.) three and five-eighths miles from Point Hudson. Half a mile south of Kala Point a small stream, called the Chimikim* Creek, opens between two high and steep cliffs; the shoal-water lies a quarter of a mile outside this mouth.

Walan Point is a very low and marshy projection on the eastern side of the bay and stretches a quarter of a mile out into very deep water. It lies south twenty-four degrees east (S. 24° E.) two and three-fourths miles from Point Hudson. Between it and Kala Point, on the western side, the bay is a mile wide, and the depth of water fourteen and fifteen fathoms, over soft, sticky bottom.

The head of the bay is visible from Point Hudson, over Walan Point, and is distant five and a quarter miles in a straight line. It is three-fourths of a mile wide between the high cliffs on the east and west, and bold water continues to the head. In the southwest angle there is a shoal-pocket, formed by a low and very narrow spit one-third of a mile long, with a rocky islet at the entrance. In the southeast angle there is a narrow channel opening into a large flat, mostly bare at low water, and bounded by a beach nearly one hundred yards across and half a mile long, which separates Port Townsend from Oak Cove. Across this beach there is a portage frequently used by the Indians.

Vessels bound into Port Townsend from the Strait of Fuca must keep clear of the rocky shoal off the northern side of Point Wilson, but as soon as Point Hudson is opened by Point Wilson the latter may be passed within one hundred and twenty yards with a depth of twenty fathoms, hard bottom; through this deep channel a strong current runs. When abreast of Point Wilson a steamer should steer southeast by south to clear the shoal ground to the northwest of Point Hudson; but a sailing vessel may keep a little inside this course until within one-half a mile of Point

* Chem-a-kum, the name of the village which belonged to a small tribe of Indians differing entirely in language from its neighbors, and akin to the Quillihutes.

Hudson, and then gradually keep away about one-fourth of a mile from the shore in from five to ten fathoms of water over hard bottom, and as the point opens run quite close, with the summer wind directly off shore, to save making a tack. There is a depth of ten to fifteen fathoms a little more than an eighth of a mile off shore. Keep along about half a mile to the south southwest parallel with the city front, and anchor anywhere off the wharves in ten to twelve fathoms, and a fourth of a mile distant. In winter anchor farther out to clear Point Hudson in getting under way with a southeaster.

When a sailing vessel is coming down the sound bound into this port, with the current ebb, she should pass Marrowstone Point nearly three-quarters of a mile before heading in for the town, and so avoid a very strong eddy which comes out of the bay along and under the high shore west of this point. If the wind be light and the ebb current strong, pass the point quite close to; run along the outside of the current rip, and try to get upon the mid-channel bank as soon as practicable, to avoid being set up the sound by the next flood.

In summer sailing vessels not employing tugs will frequently drift about the entrance for days without a breath of wind, and in very strong currents. In winter the southeast storms blow with great violence in this high latitude, and a vessel must move to an anchorage under the cliffs of the old military post to get a comfortable berth, in ten fathoms of water, soft bottom.

The *mid-channel bank* lies upon and even outside of the line joining Point Wilson and Marrowstone Point. Within the ten-fathom curve it stretches half-way from the base on Marrowstone Island towards Point Wilson, and the least water found upon it is five and three-fourths fathoms. The bottom is clear, hard sand, and was formerly a fishing ground of the Indians. North of this bank the depth drops to forty fathoms in a quarter mile, and the currents are strong. The mid-channel depth between Marrowstone Point and Admiralty Head is sixty-one fathoms, and between Point Wilson and Admiralty Head forty-four fathoms.

Between this bank and the shore of Point Wilson and Point Hudson the channel has a depth of twenty-seven to fifteen fathoms of water over hard, sandy bottom; thence through the middle of the bay the depth ranges from ten to sixteen fathoms, and deep water is carried close to the shores, except under the spit of Kilisut Harbor.

The geographical position of the station of the U. S. Coast and Geodetic Survey, on the extremity of Point Hudson, is:

Latitude	48° 07′ 06″.7 north.
Longitude	122° 44′ 25″.8 west.
Or, in time	8h 10m 57s.7.

From this it will be seen that Point Hudson is only 1m 15s west of Lafayette Park astronomical station in San Francisco.

In January, 1885, the magnetic variation of Point Hudson was 22° 35′, with a yearly decrease of 0′.6. The maximum easterly variation had been reached about ten years since, and the variation is now decreasing.

THE TIDES AT POINT HUDSON.

The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XVIh 18m. The mean rise and fall of tides is five and three-tenths feet; of spring-tides six and three-tenths feet; and of neap-tides four and three-tenths feet. The mean duration of the flood is 6h 34m, and of the ebb 5h 52m. The mean difference between the corrected establishments of the a. m. and p. m. tides of the same day is 2h 22m for high water, and 0h 35m for low water. When the moon's declination is greatest these differences are 4h 38m and 0h 27m, respectively, and when the moon's declination is zero they are 0h 40m and 0h 29m. The mean difference in height of these two tides is one and one-tenth feet for the high waters and four and six-tenths feet for the low waters. When the moon's declination is the greatest they are six-tenths of a foot and seven and three-tenths feet, and when the moon's declination is zero, one and four-tenths feet and one and four-tenths feet. When the moon's declination is greatest and north the two high waters of the day follow the moon's upper transit, respectively, by about 6h 8m and 13h 56m; and when greatest and south, by about 1h 30m and 18h 34m, the height of the two being about equal. When the moon's declination is zero, and passing from north to south, they follow the moon's transit by about 4h 9m and 15h 55m, and the first rises about one and four-tenths feet higher than the second. When the moon's declination is zero, and passing from south to north, they follow the moon's transit by about 15h 29m and 16h 35m, and the second rises higher than the first by the same quan-

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Somerset Range.

Point Bonilla, Vancouver Island.
W. by N. ¼ N., 21 miles.

Marrowstone Point, 8 miles.

Point Wilson Light-house, E. by S. ¼ S., 4 miles.

Marrowstone Point, NW. ¼ W., 9¼ miles

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, NW. ¼ W., 9¼ miles Point Partridge, 17 miles. Admiralty Head Light-house, 12½ miles. Bush Point, 1¼ miles

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¼ miles. Bush Point, 1¼ miles

tity. When the moon's declination is greatest, north or south, the two low waters follow the moon's transit by about $9^h\ 41^m$ and $22^h\ 7^m$; but when north, the second falls lower than the first by about seven and three-tenths feet, and when south the first falls lower by that quantity. When the moon's declination is zero, the two low waters fall nearly equally. The greatest difference observed between the heights of the two low waters of a day was eight and six-tenths feet, and the greatest difference between the higher high and the lower low water of a day was ten and one-tenth feet.

For the time and height of every tide throughout the year, consult the annual publication of the Pacific Coast Tide Tables of the U. S. Coast and Geodetic Survey for San Diego, San Francisco, Astoria, Port Townsend, Sitka, and Kadiak Island, with constants for reduction to other places.

Port Townsend is the county seat, and is very beautifully located on the high, rolling lands behind Point Hudson. It commands a remarkable site for a large commercial city, being situated on a peninsula eleven miles long and three miles wide, a fine harbor in front, and Port Discovery to the westward.

In the near future the railroad from the Columbia River through the Cowlitz Valley will terminate at Port Townsend. It is the port of entry of the Puget Sound collection district. The number of vessels documented at Port Townsend for the fiscal year ending June 30, 1884, was eighty six sailing vessels and seventy-eight steamers, with a tonnage of forty-seven thousand three hundred and thirty-two tons. There were entered and cleared for the same year one thousand seven hundred and eighty-eight vessels, with an aggregate tonnage of nine hundred and ninety-eight thousand five hundred and thirteen tons. Of the vessels, three hundred and forty-five were coastwise, having three hundred and twenty-six thousand one hundred and twenty-five tons; and one thousand four hundred and forty-three were foreign, with a tonnage of six hundred and seventy-two thousand three hundred and eighty-eight tons.

It is estimated that a third of the Puget Sound tonnage is licensed vessels running to San Francisco and other coast parts. They are not included in the above report.

The total value of exports for the foreign trade for 1883 was one million seven hundred and seventy thousand two hundred and nineteen dollars; and of domestic and coastwise, six million dollars. In addition, there were exported in that year hops to the value of over one million dollars.

The population of Port Townsend is about two thousand five hundred. There is a large steam saw-mill here, a manufactory of wooden wares, a brewery, etc. At Irondale, near the Chimikim Creek, was the location of iron works for the reduction of bay iron, but its operations have been suspended.

For national quarantine regulations affecting this port, see notice under San Francisco, p. 247.

From Quimper's anchorage in Port Discovery in 1791 he made a short exploration into Admiralty Inlet, and, of course, saw Port Townsend.

In 1792 Vancouver, from his anchorage in Port Discovery, sents his boats through the whole of Puget Sound. He surveyed Port Townsend and named it Port Townshend, which name has given way to the later erroneous spelling.

MARROWSTONE POINT.

This point is the first one inside the entrance to Admiralty Inlet on the western side, and with Point Wilson forms the guiding points. It lies three and five-eighths miles south seventy degrees east (S. 70° E.) from Point Wilson Light-house, and three and one-eighth miles south fourteen degrees east (S. 14° E.) from Admiralty Head Light-house.

When a vessel is entering the sound from the strait and rounding Point Wilson the steep, yellow, clay cliffs of the northwest end of Marrowstone Island are directly ahead. The cliffs were formerly covered to their edges with tall Oregon pine trees, but these have been destroyed, and the mesa land is cleared near the point, except a few stray pines. At the eastern extremity of the cliffs the land drops to a low, grassy, sandy point projecting three hundred yards from the foot of the slope, on which there are (1885) two tall trees and a few smaller scattered ones. This point has very deep water close up to it, and the currents run by it with great velocity. Close under the southeast shore of this low point there is a restricted anchorage in twelve fathoms of water over sandy bottom, where the current is invariably running ebb. Small vessels coming out of the sound with a light head wind and flood current in mid-channel can easily take advantage of this eddy

from four miles south of the point. We have worked the surveying brig *Fauntleroy* under such circumstances.

When a vessel is entering past Marrowstone Point, the farthest land that is seen through the channel is the high cliffs at Edmund Point and Point Wells on the east side of the sound, and about twenty-two miles distant.

From Marrowstone Point we have the following bearings and distances to prominent objects:

Point Wilson Light-house	N. 70° W.	3¾ miles.
Partridge Bank, Black Buoy	N. 56° W.	11½ miles.
Point Partridge, Red Buoy	N. 50° W.	8¾ miles.
Smith's Island Light-house	N. 40° W.	14½ miles.
Admiralty Head Light-house	N. 14° W.	3½ miles.
Double Bluff, east side of channel	S. 59° E.	9½ miles.
Point No Point Light-house	S. 53° E.	13⅛ miles.
Foulweather Bluff, Black Buoy	S. 44° E.	9¼ miles.

A vessel half a mile east of Marrowstone Point sees directly into Hood's Canal.

This point was named Marrow Stone Point by Vancouver in May, 1792. (Vol. I, p. 235.)

MARROWSTONE POINT LIGHT.

A *fixed red light*, lens lantern, has been suspended from an arm on a white post. The post is twelve feet high, and is about fifteen feet above the sea level. The post is about ten yards inside the high-water end of the point. There is a small white sentry box at the stake for keeping the lantern, oil, etc. This light is east by south seven-eighths south (E. by S. ⅞ S.) three and three quarters miles from Point Wilson Light house.

From the light the following bearings and distances to prominent points are given:

Admiralty Head Light-house	N. 15° W.	distant 3½ miles.
Double Bluff	S. 59° E.	distant 9½ miles.
Point No Point Light-house	S. 53° E.	distant 13⅛ miles.

This light was established October 1, 1888.

THE COURSE UP THE INLET OR SOUND.

Starting from abreast Marrowstone Point the mid-channel course up Admiralty Inlet is southeast by south for about eight miles, heading just east of Foulweather Bluff. The shores on either side of the channel are bluffs of apparently uniform height, covered with trees, with now and then an occasional low point, or a break down in the cliff where a stream empties. The shore on the east is Whidbey Island; on the west, Marrowstone Island. Four and a half miles from Marrowstone Point there is on the eastern shore a low point projecting half a mile out from the general direction of the shores; it has one or two clumps of trees and bushes with low ground behind, and the ground rising therefrom and densely wooded with Oregon fir. This is called *Bush Point.** There is very deep water close to this point, and we have anchored on the north side in fifteen fathoms, sandy bottom; but the currents are strong and irregular.

Abreast this point on the opposite shore of Marrowstone Island there is a round point covered with trees one mile and a half north of the southern end of the island which forms the northeast shore of Oak Bay. Directly off this point there is good anchorage in twelve to fifteen fathoms of water. The peculiar geological formations found in the vicinity suggested the designation *Nodule Point*,* which it bears.

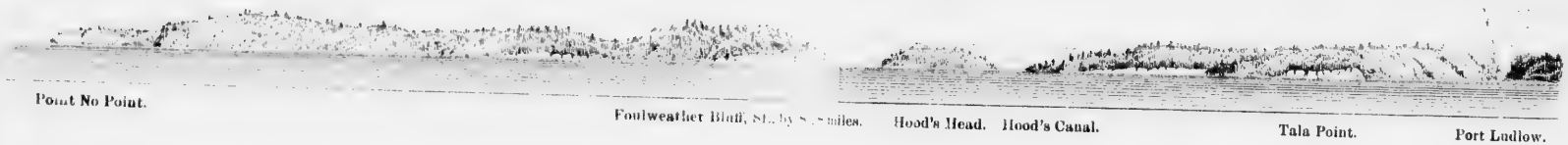
After passing Nodule Point the deep bay to the westward is Oak Bay; the bight two or three miles southeast of Bush Point, is Mutiny Bay. The high, bold, bright bluff covered with trees almost directly ahead is Foulweather Bluff. It is a conspicuous object; there is nothing like it in this vicinity. (See page 595.)

The high cliff on the eastern shore four miles southeastward from Bush Point is *Double Bluff.** It is destitute of trees, except one large clump which marks it conspicuously from the northwest. The deep indentation on the northwest side of this cliff with low wooded land in the rear is *Mutiny Bay.**

The low point with a Light-house beyond and to the east-southeast from Foulweather Bluff is Point No Point, and the high cliffs on the eastern shore six miles to the east-southeast from Double Bluff is Scatchet Head.

* Named by the U. S. Coast Survey in 1855.

Bush Point.
Double Bluff.
Point No Point.
Foulweather Bluff, SE. ¼ S., 10 miles.
Nodule Point.


Point No Point.
Foulweather Bluff, SE., by S., 9 miles.
Hood's Head.
Hood's Canal.
Tala Point.
Port Ludlow.

Double Bluff.
Puget Sound.
Point No Point, SE. ¼ E., 5 miles.

The opening on the west side of Foulweather Bluff is Hood's Canal; and vessels bound into it keep close to the west shore of the bluff and pass two low points lying close by the shore just south of the head. The water off them is deep.

When the eastern part of Foulweather Bluff bears southeast by south one-third south, and the southern part of Double Bluff east by north, a vessel will be two and a third miles from the former and two and two-thirds miles from the latter. If bound up the sound the course will be east by south quarter south for the next six miles to abreast Point No Point Light-house, with Scatchet Head to the east-northeast.

OAK BAY.

This is the deep bight on the west side of the inlet lying under the south end of Marrowstone Island and the south end of Kilisut Island on the north and the main shore of the Quimper Peninsula on the south. The turning point from the inlet into the north side of the bay is five and one-half miles southeasterly from Marrowstone Point.

The bay has a general northwest by west half west direction and heads close up to the head of Port Townsend, and is separated therefrom by a low narrow beach, across which the Indians formerly had a portage for their canoes. From the north point of the bay the direction of Point Olele, which forms the southern point of the bay, is southeast by south two-thirds south (SE. by S. $\frac{2}{3}$ S.) two miles, and from this line the bay is two and two-thirds miles deep, and three-fourths of a mile wide at the head. It opens directly towards Foulweather Bluff. The shores around the bay are moderately high bluffs, except at the narrow opening between Marrowstone Point and Kilisut Peninsula and at the beach towards Port Townsend; the cliffs at the southwest shore are lime-stone.

The depth of water in the bay ranges from twenty-one fathoms at the entrance to ten fathoms close to the head, with muddy bottom. The deep water runs close to the shores, except off the north point, where a depth of ten fathoms is found three-fourths of a mile from shore, with a sudden drop to twenty fathoms.

In beating out of the inlet or sound, with a favorable current, vessels should not attempt to work into this bay for the sake of a long tack.

Vancouver named it Oak Cove in 1792, his boats having reported that oak trees stood upon its shores. We have traversed the greater part of the shores, but found none.

MUTINY BAY.*

This is the moderately deep, broad bight on the eastern side of the inlet, seven miles south east by east half east (SE. by E. $\frac{1}{2}$ E.) from Marrowstone Point, and on the northwest side of the projecting mesa of Double Bluff. It is two and a half miles broad, and the low wooded shore-line retreats a little over a mile.

There is a deep-water channel close under the shore of Double Point and following nearly to the northern point of the bay, where the depth is twenty-four fathoms; but making out from this shore in a direction outside of Double Point there is a shoal middleground, upon which depths from six to eleven fathoms of water are found. This is an excellent fishing ground.

DOUBLE BLUFF.*

This is a mesa promontory one mile wide and one and a half miles long, lying between Mutiny Bay on the west and Useless Bay on the east. The cliffs are three or four hundred feet in height, and the greater part of the surface back from the face is covered with trees, but near the water it is destitute of trees, except one large clump which marks it conspicuously in going up the sound. The northwest spur of this point is the higher.

FOULWEATHER BLUFF.†

This is one of the most noticeable of the many cliffs in Puget Sound. It is the northwest extremity of a seven-mile peninsula which separates Admiralty Inlet from the entrance to Hood's Canal. It is the landmark for making Port Ludlow at the entrance to that canal and Port Gamble, five miles inside. The north-northwest face is about two-thirds of a mile broad, with nearly ver-

*Named by the U. S. Coast Survey in 1855.

†Named by Vancouver in 1792. The Indian name is Pitch-pōl.

tical sandy, clay cliffs about two hundred and twenty-five feet high, and covered on the summit with heavy firs and a very dense undergrowth. It slopes toward the east to a bluff forty feet high; but on the side next to Hood's Canal the cliff is steep. Hood's Canal is here almost one and two thirds miles wide, and the inlet across to Double Bluff is barely three miles across.

The low point four miles east of Foulweather Bluff is Point No Point, making well out, and destitute of trees or bushes. Between it and Foulweather there is a broad bight, without any reasonable chance for anchorage; it has deep water and strong currents. The distance across the deepest part of this bight one mile from the bluff across the low neck to Hood's Canal is about a quarter of a mile in one part; and in 1855 this neck was marked by the track of a recent tornado that had twisted off and uprooted firs of three and four feet diameter.

On the southwest side of the bluff two small points make out, with a little recession between them. The northern one is low.

FOULWEATHER BLUFF BUOY.

Comparatively shoal water makes out northward from this bluff, so that the twenty fathom line is nearly a mile towards Bush Point, and the ten-fathom line reaches two-thirds of a mile towards Double Bluff.

A *rock awash* at the lowest tides lies off the face of the bluff a little to the east of the middle of the face, and a depth of three fathoms is found outside of this danger.

For the mark this dangerous ground a *black buoy* will be placed off the north face of the bluff on the side of the broken rock one-half mile from the shore, and in about five fathoms of water. (Not placed in September, 1887.) From this buoy we have the following bearings and distances to important objects:

Black Buoy off Tala Point east side of Port Ludlow	S. W. ¾ W.	2¼ miles.
Marrowstone Point	N. 40° W.	10⅛ miles.
Admiralty Head Light-house	N. 34° W.	12 miles.
Double Bluff, northwest point	N. 32° E.	2¾ miles.
Scatchet Head	N. 82° E.	7¾ miles.
And Possession Point, almost in range		9⅝ miles.
Point No Point Light-house	S. 81° E.	4 miles.

USELESS BAY.*

On the east side of the point of Double Bluff the shore runs to the northward for two and a third miles, and then swings round in a long curve to the east and to the southeast to Bush Point, one mile west northwest from Scatchet Head and four and three-fourths miles south two-thirds south from Double Bluff. This forms a bay nearly five miles broad at the mouth, and a half miles deep to the northward. It lies broad open to the south, and looks directly to Point No Point. The shores of this bay are in part bluff and in part low, with a fringe of trees nearly around the whole bay. There is deep water in this bay, the forty fathom curve reaching into it, and the twenty-fathom curve running nearly to the deepest part of the shore. The best water is under the northeast shore, where the ten-fathom curve stretches out one mile, with bottom of sand. At the head of the bay there are two long, narrow sand spits, behind which is Deer Lagoon,† a large, shallow sheet of water, full of marshy islets and having a shallow outlet between the sand spits. At the eastern part of this lagoon is the settlement of Useless Bay.

POINT NO POINT.

This is one of the turning points in the broad waters of the sound. In a straight line thirteen miles southeast two-thirds east (SE. ⅔ E.) from Marrowstone Point, and from the entrance to Possession Sound lies east by north six and a half miles.

The point itself is low and just above high water, with a gully and small stream of water in the western part. To the westward the broken cliffs run in a concave, curving line to Foulweather Bluff. To the southeast by south the shore is nearly straight for ten miles, with increasing height to the cliffs, and a low, narrow, marshy line under them to Pilot Point, two and a half miles distant. The land behind it is two or three hundred feet high, and moderately broken. Deep water runs close to the point, and one-third of the way across the channel abreast

* Named by the U. S. Exploring Expedition, 1841.

† Discovered and named by the U. S. Coast Survey in 1856.

is a depth of one hundred and fourteen fathoms. Under the south side of the point there is good anchorage in ten fathoms.

THE LIGHT-HOUSE AT POINT NO POINT.

The structure for this light is a low, square tower, painted white, with the lantern and dome painted black. There is an oil room attached to the tower, and the wooden dwelling, of one and a half stories, painted white, is located sixty-seven yards to the westward.

The illuminating apparatus is of the fifth order of Fresnel, lighting two hundred and seventy degrees of the horizon, and was exhibited January 1, 1880. From sunset to sunrise it shows a *fixed white light.*

The base of the tower is seven feet above the water, and the focal plane of the light is twenty-seven feet above the mean level of the sea; and under ordinary conditions of the atmosphere the light ought to be seen about ten and a half miles.

THE FOG-BELL.

The bell tower is located on the outer end of the point, to the southward of the Light-house, and was first put in operation May 1, 1880. During thick or foggy weather the bell is struck by machinery at intervals of ten seconds.

The geographical position of the Light-house is given quite closely from the U. S. Coast and Geodetic Survey charts:

Latitude	47° 54′ 44″ north.
Longitude	122° 31′ 31″ west.
Or, in time	8h 10m 06s.1.

From the Light-house on Point No Point we have the following bearings and distances to important objects:

Black Buoy off Foulweather Bluff	W. by N.	3¾ miles.
Red Stake Light on Point Marrowstone	N. 53° W.	13½ miles.
Admiralty Head Light-house	N. 46° W.	16 miles.
Over Bush Point at		7¾ miles.
Double Bluff	N. 38° W.	3¾ miles.
Possession Point, entrance to Possession Sound	N. 70° E.	6 miles.
Apple Cove Point	S. 40° E.	6¼ miles.

West Point Light-house is not visible on account of Apple Cove Point intervening.

Point No Point was named by the United States Exploring Expedition in 1841. The Indian name is Hahd-skus.

SCATCHET HEAD.*

This is the southern point of the long and irregular Whidbey Island; it stretches as a promontory into a broad part of Admiralty Inlet, and is visible for twenty-five miles from the south-southeast; it is directly abreast of Point No Point. The southern entrance of Possession Sound is on its eastern side and Useless Bay on the western. It is a double-headed promontory, with a length of six miles and an extreme breadth of two and three-fourths miles between Useless Bay and Possession Sound.

The two heads have each a face of about three-fourths of a mile in breadth exposed to the south; they are bold yellow clay cliffs; the eastern one rises about three hundred feet above the water, and is covered with wood, and the western one rises one hundred and forty feet or more. The western head has become locally known as the False Scatchet. Off the base of the bright cliffs there are seen great erratic granite bowlders.

POSSESSION POINT.†

The lower part is a nearly vertical white clay cliff; then the bank slopes at an angle of forty-five degrees, with a partially broken whitish front, until it reaches one hundred and forty feet elevation. There are a few scattered trees on the lower part of the slope, and the summit level is covered with Oregon pine.

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* Named by the U. S. Exploring Expedition in 1841. The proper spelling of the word is Skadg-it; the Indian name of the point is Skoolhks. To the captains on the sound this point has become known as "False Scatchet."

† This point has become locally known as Scatchet Head.

The shore under the eastern side of the head is bordered by a low, narrow beach.

The eastern shore of the entrance to Possession Sound abreast this head rises from a low, narrow beach with deciduous trees on the lower slope and Oregon pine on the summit. Yellow bluffs show in patches through the trees.

Between the two heads there is a shallow pocket running back one and a half miles, called *Cultus Bay*. It is in part overflowed at high tide, and then presents the appearance of a bay. An extensive sand-bank and shoal makes out nearly three miles to the southward, with the breadth of the heads as a base. From the eastern head round the western, and a mile toward Useless Bay, the low-water line makes out half a mile, the shore being bare, where older maps have deep water. For over a mile south of the western head a depth of eight and ten fathoms of water and smooth sandy bottom can be found; while the twenty fathom line runs out three miles directly for Apple Tree Cove, with a bottom of sand, gravel, and shells. We found, when anchored for several days off the eastern head, a strong under-current running into Possession Sound, and an upper current setting to the westward at all tides. Vancouver makes mention of the shoal, and states that beating into the inlet he stood on the bank until he got five fathoms of water, but want of time precluded his examining it.

Off the south side of Possession Point on the line of three fathoms we found a *rock awash* at the lowest tides. It is about two hundred and fifty yards off the front of the cliffs.

THE COURSE UP THE SOUND.

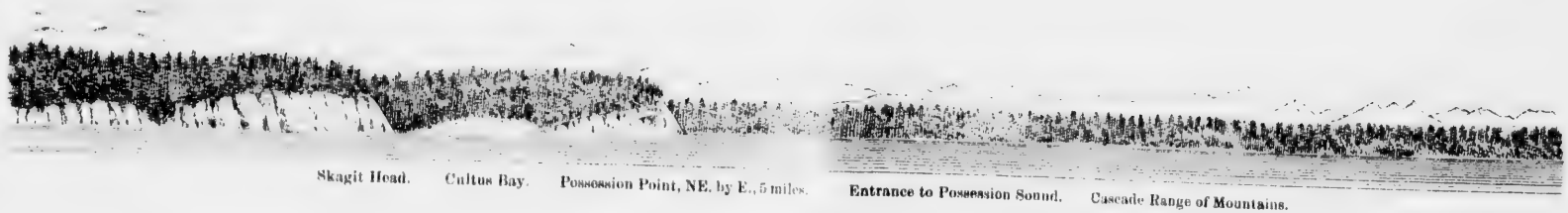
Opposite Point No Point the sound expands to a width of seven miles, with a very deep channel between the point and the bank off Scatchet Head, and a deep channel between the head and the shore of the mainland. This latter channel, over two miles wide and one hundred and twenty fathoms deep, leads into Possession Sound. From Point No Point a vessel bound farther up the sound will naturally keep the mid-channel, but a general course for a vessel when one and a quarter miles northwest half west from the light-house on the point is southeast half south for ten and a half miles, to mid-channel abreast of Point Jefferson, the north point of Port Madison, where the channel is three and two thirds miles wide. A vessel bound into Port Madison or Port Blakely will gradually haul to the southward of that course and pass close under Point Jefferson, if the wind holds under the land; if bound into Seattle she will gradually haul a little to the southward to pass West Point closely as soon as she makes out the Light-house buildings upon it.

From abreast Point Jefferson the course is south by east for five miles, to abreast West Point Light-house, and if bound for Port Blakely a vessel continues another four and a half miles, to the entrance on the north side of Restoration Point. If bound farther up the sound to Tacoma or beyond, a vessel continues on the south by east course two miles beyond West Point Light-house, and then hauls up on a southeast three-quarters south course for Point Robinson Light-house, on the west side of the channel, distant fifteen and a half miles. The average width of the channel between Vashon Island on the west and the main shore on the east is two and a half miles, and the depth of water is over one hundred fathoms. The shores are generally of the same character, of yellowish clay cliffs, with low, gravelly or sandy points, having deep water close under them, and deep broad bays and channels lead from the main sound. These channels or passages, like those into Port Orchard, are marked by overlapping shores. The Colvos Passage is one of these; it is eleven miles long, deep, and one mile wide, and nearly straight, but it is not now used.

We resume the detailed description of important places on the main channel from Point No Point to Robinson Point, including Possession Sound.

POSSESSION SOUND.

The southern entrance to this now important and extensive series of broad deep channels lies between Possession Point, the southernmost point of Whidbey Island, in latitude 47° 57′, and the main shore opposite, unmarked by any special projection or object. Scatchet Head and Possession Point have already been described. The northern entrance to this sound is the narrow, narrow, and deep Deception Pass, in 48° 24½′. The sound is formed by the irregularly shaped Whidbey Island on the west and the main shore on the east, with Gedney and Camano Islands between them. The sound receives several important water-courses, the Snohomish River in the southeast, the Stillaguamish River about the middle, with the Skagit River in the northeast. It also connects at the north by the Swinomish Slough with Padilla Bay, and thence with Guemes


Skagit Head.
Cultus Bay.
Possession Point, NE. by E., 5 miles.
Entrance to Possession Sound.
Cascade Range of Mountains.

Possession Point, N. ½ E., 7½ miles.
Possession Sound.
Point Elliot.

West Point.
SE. by S., 11¼ n
Battery Point.
t Sound.
Robinson's Point.
Point Jefferson.
Appletree Point.

Channel and Bellingham Bay. The depth of water throughout the sound is large, except at the deltas of the rivers, which bring down an immense amount of alluvial material that quietly deposits and forms very extensive mud flats. That from the Squonamish River has nearly filled in across the sound and reduced the channel to one-third of a mile wide, with only four to six fathoms of water. There are numerous villages and towns on the rivers and on the shores of the sound, and besides the traffic in sailing vessels, regular communication is kept up by steamer from Seattle with all the towns and settlements. The shores present the general features of Puget Sound, but the channels are narrower, averaging about two miles in width, and the depth of water inside the southern entrance reaches sixty-five fathoms. There are no known dangers in the channels. The shores of the deltas of the rivers are low and muddy, and behind them there is a dense forest and undergrowth. We have lately passed through the sound and through Deception Pass in both directions in one of the Possession Sound steam-boats.

PORT GARDNER.*

The southern part of the sound runs almost north from Possession Point for three and a half miles, to abreast Point Elliot on the east, when it widens out into a nearly circular basin five and a half miles in diameter, with Gedney Island a mile and a half long in the middle; this basin is locally known as Port Gardner, although the Coast Survey chart restricts that name to the southeast part. The shores are high and bold, and wooded on the summit of the flat mesa-like lands. There is deep water and no dangers close under either shore. This port receives the Snohomish River in the northeast part. The river in its lower course comes through a marshy valley two miles wide. Behind Point Elliot is the town of Muckiltéo, which has two small wharves and probably twenty houses; and four miles farther along the shore to the northeast is the town of Port Gardner.

In the northwest part of this port the high southeast point of Camano Island, called Point Allen,† divides Port Gardner into two channels leading to the northwest; the one to the east two miles wide leads to Port Susan and the Stillaguamish River; the one to the west is the Saratoga Passage, and leads by a fine, broad, deep channel, fifteen or sixteen miles long, between the west side of Camano Island and the east side of Whidbey Island, to the north end of the former.

Point Allen at the south end of Camano Island, and Sandy Point on Whidbey Island, one and two-thirds miles south of the former, are the entrance points to Saratoga Passage.

Tides at Muckiltéo, Port Gardner.—The Corrected Establishment, or mean interval between the moon's transit and the time of high water, is xvi^h 50^m. The mean rise and fall is 6.9 feet.

To obtain the times and heights of any tide throughout the year consult the Pacific Tide Tables, published annually by the U. S. Coast and Geodetic Survey. For any required tide first take out the quantities from the Port Townsend Table for the required date. To the given time of high water add thirty minutes, and to the height add one and four-tenths feet; to the given time of low water add forty-two minutes, and from the height subtract four-tenths of a foot.

GEDNEY ISLAND,

Lying in the middle of Port Gardner, is one and a half miles long east by south and west by north. When seen from the northwest, coming out of Saratoga Passage, it shows a moderately steep bluff to the west, and a low, slowly rising bluff to the east, both covered with Oregon pine. There is one prominent tree on this east point where a low sand spit shows out about fifty yards as it is approached. As seen from the northward, broadside on, the ridge-line of Gedney Island looks moderately level, about eighty feet high, and covered with Oregon pine. The trees are the higher on the northwest end.

Off the southeast point of the island there is a great erratic bowlder visible at low water. There is moderately deep water around the island. A bank with fifteen fathoms is reported by the steam-boat captains to lie more than half a mile off the northwest point of the island towards Allen Point or Camano Head. Around the south shore there is a depth of ten fathoms nearly half a mile off; and on the prolongation of the axis to the east-southeast of the southeast point there is a shoal which extends out a little over half a mile with a depth of only three and a half fathoms at the end. Outside of these the depths increase to as much as sixty-five fathoms.

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*This was named Possession Sound by Vancouver in May, 1792.

†Named by Vancouver in May, 1792, Point Alan.

TULÁLIP.

This is an Indian reservation in the small bay of the same name. It lies on the main shore nearly abreast of Allen Point at the entrance to Port Susan. The west point of the entrance has a bright patch of bluff with pines upon it; the bluff is about forty feet high and sixty yards back. The southeast point has a bright bluff with trees, and a low neck of land towards the buildings of the Sisters of Charity.

The bay is protected by two points, and the entrance somewhat restricted by a shoal reaching out from the northwest point to the middle of the opening. The entrance is open to the southwest, and the two points are about one-third of a mile apart. The land is low and cleared around the bay; all the buildings are Reservation buildings, and are on the sloping plots in the northeast part of the bay. In the southeast angle of the bay there are two large buildings of the buildings of the Sisters of Charity, with a small church between them.

Tulálip Bay Buoys.—Two buoys have been placed to mark the entrance to this anchorage. One is a *black spar buoy*, and the other is a *red spar buoy*.

Port Susan, Stillaguamish Slough.—Two spar-buoys have been placed off the northeast side of Camano Island to mark the channel into Stillaguamish Slough, at the north end of Port Susan.

Port Susan, Davis Slough.—Six spar-buoys have been placed to mark the channel leading into Davis Slough, one of the mouths of the Snohomish River.

SARATOGA PASSAGE.

This is the fine, broad, deep strait leading from Port Gardner to the northwestward between Camano Island on the east and Whidbey Island on the west. This strait, from Camano Head to the mills of Utsalády, is eighteen miles long. The eastern shore is continuous, whereas into the western shore penetrate Holmes Harbor, Penn's Cove, Oak Harbor, and Duncan's Bay. The strait averages two miles in width; the shores are bluffs covered with Oregon pine, but not so densely as before the saw-mills depleted the forests. There are prairie openings on either side. The channel is from twenty fathoms to fifty five fathoms deep, with good water close under the shores. No steam-boat navigation could be better in good weather. In smoky or foggy weather the steamboats run by courses and time, according to the currents, and use the echo of the steam-whistle to determine their proximity to the land.

This strait was named Port Gardner by Vancouver in May, 1792. It received its present name from the United States Exploring Expedition in 1841.

ALLEN POINT.

This is the south end of Camano Island, and forms the north point of the entrance to Saratoga Passage. It rises inland to the top of the trees, which are estimated at one hundred and sixty feet above the water. A great land-slide has taken place here, and three or four acres of the point has slid away, leaving a low, outer white clay cliff, with a few trees upon it; then the surface rises back to the base of the second or inner white clay cliff, which rises to about one hundred feet above the water, and is covered on the summit with high pine trees. There is deep water off Point Allen.

This point is known to steam-boat captains as Camano Head.

There is a tradition among the Indians that when this slide took place many Indians were killed, and they never land upon it.

Sandy Point, on Whidbey Island, abreast of Allen Point, and forming the south point of the entrance to Saratoga Passage, is moderately long, low, and has no bushes. The bluff behind it rises by three steps, with straggling trees. There is a house at the inner or western end of the low beach of the point, with a cleared space on the sloping, rising ground, and a white house in the upper part of the clearing. There is bold water close under this point. It is locally known as Joe Brown's Point.

East Point is on the west side of Saratoga Passage, six miles west by north one quarter north from Sandy Point. The point on the opposite side of the channel, distant one and a half miles and bearing north by west, is Point Lowell, on Camano Island. East Point is a short, low, grassy spit, backed by a high bluff well wooded. The tops of the trees are estimated to be one hundred and fifty feet above the water. There is very deep water off the point. Point Lowell has very

deep water off it. One and a third miles west southwest from East Point is Rocky Point, the turning point into Holmes Harbor, which runs south southeast for four and a half miles; it is one and a half miles wide, and has twenty fathoms of water to the head, which is only one mile from Mutiny Bay.

Rocky Point is low at the water's edge and rises gradually to eighty feet. The trees have been cut away and scrub now covers it. About one hundred yards off the point is a rocky islet covered with scrub. It is about fifty yards in extent at low water, and is then connected with the point.

Watsak Point lies on the west side of the Saratoga Passage and nine and a half miles north fifty eight degrees west (N. 58° W.) from East Point, where the passage widens to four or five miles; towards the west, around Point Watsak, is the beautiful harbor of Penn's Cove, three and a half miles long and one mile wide, with fifteen to seven fathoms of water, and heading within a mile and a half of Point Partridge; towards the north-northwest are the broad bays of Oak Harbor and Duncan's Bay; to the northeastward just beyond Point Demock is Utsalády.

There is deep water along all these shores, except off Point Watsak, where a narrow shoal runs to the north-northwest for fully half a mile, with twenty-one fathoms of water on the east side and sixteen fathoms on the west side.

BUOY OFF WATSAK POINT.

At the extremity of Point Watsak there is placed a *second-class can-buoy painted black and numbered* 1. It is placed in four fathoms of water about fifty yards off the end of the spit, which has only one fathom upon it at low water. From this buoy Point Demock bears northeast half east, four miles distant; and Forbes Point, lying between Duncan's Bay and Oak Harbor, north-northwest, distant two and a third miles.

This point is locally known as *Snakeland Point*, and is so noted in the buoy list.

POINT POLNELL.

This point is on Whidbey Island and forms the eastern boundary of Duncan's Bay; it lies four miles north by east half east (N. by E. ½ E.) from Watsak Point; two miles northwest by west (NW. by W.) from Point Demock, and two and one third miles west from Utsalády. Between it and Utsalády the broad Saratoga Passage may be said to end at the turn around Point Demock, the northwest point of Camano Island.

Point Polnell is a long narrow point jutting out to the south-southeast from the rounding shore behind it. When seen from the southward it looks like a bluff-faced islet. Locally this point is known as Miller Point.

UTSALÁDY.*

This is the most important place on Possession Sound. It lies on the northwest side of Camano Island, twenty-seven miles by mid-channel course from the southern entrance of Possession Sound. The channel to it through Saratoga Passage averages nearly two miles wide, the water is deep, the shores are bold, and there are no known dangers. The chart is a good guidance for a vessel, but the usual procedure is for a vessel to be towed either way; nevertheless, we give herewith short descriptions of the points, etc., as high up as Utsalády.

There is a very extensive saw-mill located here, capable of a daily output of a hundred thousand feet of lumber; there is deep water close to the wharves, and capital protection in all weathers. Vessels reach it by the south entrance to Possession Sound, through Port Gardner, and Saratoga Passage to Point Demock. It is at the head of the broad waters of the Saratoga Passage on the northwest shore of Camano Island. Point Demock is a long rounding point forming the northwest angle of the island, and Utsalady is about a mile and a quarter to the northeast from it, with the islet-like bluff of Point Polnell bearing west, distant two and a third miles.

In a strong northerly wind there is no swell from the broad water towards the shores of the delta of the Squonamish River, because they are mostly flats.

Many deep vessels have loaded at Utsalády with lumber and spars for the Pacific Coast ports,

*Pronounced Oot-sah-lah'-di.

for the south Pacific, Australia, Asiatic, and European ports. At one time it did a large traffic with France.

The approximate geographical position of Usalády is:

Latitude	48° 15½′ north.
Longitude	122° 30½′ west.

The magnetic variation in January, 1886, was 22° 28′ east, with no annual increase.

Oak Harbor and Duncan Bay are two bays on Whidbey Island at the northwest part of Saratoga Passage. There is the town of Oak Harbor at the head of the former. *Forbes Point* is a broad peninsula, one and a half miles long, lying between the two bays, and stretches south by east (S. by E.). Around this broad point is shoal water, and buoys have been placed to enable the steam-boats to avoid it in foggy and smoky weather.

FORBES POINT BUOY.

The buoy off the Forbes Point Shoal at the entrance to Oak Harbor has been moved two hundred yards to the southward into four fathoms of water, and is now a *second class can buoy painted red*. It is located by the following bearings and distances:

Southwest tangent to Forbes Point	N. by W.	¼ mile.
Point Polnell	NE. ¾ E.	3 miles.

OAK HARBOR BUOY.

A *black spar-buoy* has been placed on the western side of the entrance to Oak Harbor. It lies about one mile west by south one-quarter south (W. by S. ¼ S.) from the red buoy off Forbes Point.

Oak Harbor Light is a *fixed white light*, dioptric (lens lantern), shown from a white post [illegible] feet high. It is fifteen feet above the water, and is placed at the inner end of Maylor's Spit, where it joins the bluff. It is kept on the starboard hand in entering.

Maylor's Spit Light is a *fixed red light*, dioptric (lens lantern), shown from a white post eight feet high. It is twenty-five feet above the water. It is placed at the extremity of Maylor's Spit, and is kept on the starboard hand in entering.

SKAGIT BAY.

Skagit River Entrance Buoys.—Six spar-buoys have been placed to indicate the channel at the entrance to Skagit River.

SARATOGA PASSAGE (SKAGIT BAY).—APPROACHES TO LA CONNER, AT THE SOUTH ENTRANCE SWINOMISH SLOUGH.

La Conner Light.—This is a *fixed white light* shown from a lantern upon a white post forty feet high and twenty five feet above the water. It is located on the western point of the southernmost part of Fidalgo Island, abreast of Small Island, and about one and a half miles [illegible] one quarter south (SW. ¼ S.) from La Conner, but is not visible therefrom.

Hole in the Wall Light.—This is a *fixed red light* shown from lantern upon a white [illegible] feet high and fifteen feet above the water, about midway from La Conner Light to the [illegible] placed on the east side of Narrow Channel, on the west side of the island, on a rocky [illegible] sharp turn of the passage. This position is locally known as the Hole in the Wall, and [illegible] one mile south from La Conner.

Point Pleasant Light.—This is a *fixed red light* shown from a lantern upon a white post [illegible] high and six feet above high water. It is placed on a low point inside of the Hole in the Wall, on the east side of the channel. The point is covered at high water. The light is about [illegible] eighths of a mile southward from La Conner.

The approximate geographical position of this light is latitude 48° 22′ 41″ north and longitude 122° 30′ 06″ west.

Gilliper Point Light.—This is a *fixed red light* shown from a lantern upon a white [illegible] feet high and six feet above high water. It is placed on the starboard side of the channel leading to La Conner) upon a low point of the main land, one-quarter of a mile from La Conner, and about ten feet from the edge of the channel. The point is covered at high tide.

La Conner Channel Buoys.—Six spar buoys have been placed to indicate the channel to the town of La Conner, in addition to the four stake lights.

Returning from Possession Sound we resume the descriptions south of Point No Point.

APPLE TREE COVE.

Six and one-eighth miles south forty degrees east (S. 40° E.) from Point No Point is a low point rising behind to higher ground, which is wooded. From this point there is a soft muddy flat extending several hundred yards up the sound, with good water over it. From five to twelve fathoms of water and sticky mud bottom are found fully half a mile from the shore, and a depth of six fathoms is carried well into the cove, which is formed by a broad receding of the shore for nearly one mile to the westward. The head of the cove is a mile and a half south of the point, and vessels may avoid adverse currents by anchoring on the muddy bank. The head of the bay is marshy; no fresh water was obtainable here for the ship. The south shore of the cove runs almost east-southeast for a mile, and then trends more to the south for one mile, to President Point. There is very deep water close under the southern shore of this cove.

It was named by the United States Exploring Expedition in 1841.

EDMUND POINT.

Directly abreast of Apple Tree Cove, on the east side of the inlet or sound, are two points, one and two-thirds miles apart, north-northwest and south-southeast from each other. The northern is Edmund Point, bearing south sixty-four degrees east (S. 64° E.) eight and one-third miles from Point No Point, and north twelve degrees west (N. 12° W.) eight and two-thirds miles from West Point Light-house.

It is a low, rounding point, with a lagoon inside its shores, and it makes out from the low, narrow valley behind it. There is a bluff to the southward. Thence to Point Elliot, on the east side of the entrance of Possession Sound, the direction is almost north nine and one third miles. The shore north of it is low and the water deep; off the point itself the water is very deep. The inlet is here three and three-fourths miles wide.

POINT WELLS.

This is the low point on the east side of the sound, one and a half miles south-southeast from Edmund Point, making out from the high bluff behind it. There is a slight recession of the shore between the two points, and the ten-fathom line is outside of the line joining them, but there is anchorage in the bight, although contracted, and the chances are good for fresh water at high tide. The thirty-fathom line is close under the point.

PRESIDENT POINT AND POINT JEFFERSON.

On the west side of the sound, and on the north side of the entrance to Port Madison, there is a line of moderately high, straight, bluff shore with the land rising behind it and covered with trees; it commences at President Point, three and one-fifth miles south thirty-one degrees east (S. 31° E.) from Apple Tree Point, and continues one mile south-southeast to Point Jefferson, when the shore makes a sharp turn and runs to the west-southwest for more than three miles. This southern face of Point Jefferson is a low bright cliff in places. When abreast Point Jefferson it shows broken white cliffs decreasing to the northward and to the southwestward, and then from the latter rising again. Stretching broad off the shore between President Point and Point Jefferson for more than half a mile, there is a nine fathom bank which affords capital anchorage for vessels when drifting with light airs and adverse currents. Close under the south side and extending out to four and a half and five fathoms of water there is a compact mass of kelp one-third of a mile long parallel with the shore southwest and northeast.

We discovered this bank in 1856.

PORT MADISON.

This is a broad and deep recession of the western shore of the inlet. Under the north shore it stretches in three miles west-southwest; and the entrance towards the inlet is two miles wide. The northern and western shores are the mainland of the Great Peninsula between Admiralty

Inlet, Puget Sound, and Hood's Canal. The south shore is the northern limit of Bainbridge Island. There is deep water throughout this large bay, ranging from eighty fathoms at the southeast part to twenty fathoms at the northwest part, but there is a narrow bank stretching one mile south of Point Jefferson with fifteen fathoms of water, sandy bottom.

Point Jefferson is the northeast point of the entrance and has already been described. The southeast point is a low, narrow, sand spit curving inward from the outer shore to the westward and merely outlying the cliffs one-fifth of a mile. This is Point Monroe. One mile west southwest from Point Monroe there is the narrow entrance to a natural deep canal, upon which, in full view from the Port, are situated the Port Madison saw-mills. In the west part of the bay is the very narrow entrance to Port Orchard.

The north shores of the bay are broken white cliffs and intervening low beaches. The western face is moderately low bright cliffs, with the white buildings of the Indian reservation on the southwest angle at the entrance to Agate Passage. The south shores are broken cliffs, except at the entrance to the Port Madison docks. A great bulk-head is being gradually pushed out on the east side of this contracted and short arm, which penetrates about one and a half miles to the south-southwest. The great mills are half a mile inside the northeast point of the entrance. They have very ample wharf facilities, and mooring dolphins for vessels to haul out to. The channel is very narrow and carries thirteen feet of water. Outside the entrance to this inner port the water deepens to fifteen fathoms in less than half a mile, except to the west-southwest, where there is a long spit with only thirteen to eighteen feet of water upon it for three and one eighth miles from the shore.

The output of lumber from these mills is very large; they have a daily capacity of over one hundred and twenty-five thousand feet.

Port Madison is the county seat of Kitsap County, of which the population is about two thousand five hundred; and the assessed value of the property one and a half million dollars.

The north and west shores of this bay are Indian reservation.

BUOY OFF POINT MONROE.

It is a *black buoy*, placed just outside the three-fathom bank, which makes out north one-eighth of a mile from the low sandy hook of Point Monroe. Very shoal water is carried out very nearly to the three fathom line, and then the depth increases to ten fathoms in fifty yards and to twenty fathoms in two hundred yards.

From this buoy we have the following bearings and distances to prominent objects:

Cliff at the northeast entrance to the harbor	SW. ¾ W.	⅞ mile.
Line to clear rocks off the above cliff	WSW.	⅞ mile.
Cliff at Point Agate	West.	1⅛ miles.
Point Jefferson	N. by E.	2½ miles.
Tangent to Southeast Cliff, Point Monroe	SE. ½ S.	⅞ mile.
West Point Light-house	S. 70° E.	4¼ miles.

The buoy was removed in January, 1888.

Point Monroe, New Light.—A lens lantern showing a *fixed red light* is suspended from a white post eighteen feet high and about twenty-five feet above the level of the sea. It is placed on the spit of Point Monroe, about ten feet inside of high-water mark and one hundred and fifty yards from the low-water end of the spit. From this light West Point Light-house bears E. by S., distant four miles. This light was first exhibited March 15, 1889.

From Point Jefferson we have the following bearings and distances to important objects:

West Point Light-house	S. 40° E.	5½ miles.
Robinson Point Light-house	S. 33° E.	22½ miles.
Restoration Point (at Port Blakely)	S. 21° E.	10½ miles.
Black Buoy, Point Monroe	S. by W.	2⅞ miles.

Tides at Port Madison.—The Corrected Establishment, or mean interval between the time of the moon's meridian transit and the time of high water, is XVI^{h} 46^{m}. The average rise of tide is ten and one tenth feet above the plane of reference of the chart is ten and one tenth feet.

To obtain the time and height of every tide throughout the year, consult the U. S. Coast and Geodetic Survey Tide Tables for the Pacific Coast.

The geographical position of the north end of the mill at Port Madison is:

Latitude	47° 41′ 57″ north.
Longitude	122° 31′ 49″ west.
Or, in time	8^{h} 10^{m} 07^{s}.3.

In January, 1885, the magnetic variation was 22° 12′ east, and the annual increase about one minute.

Port Madison was named by the United States Exploring Expedition in 1841. The Indian name is Noo-soh′-kum.

BAINBRIDGE ISLAND.

This island lies in a deep bight of the Great Peninsula, and its eastern shore forms the western side of the inlet or sound directly abreast West Point and Duwamish Bay. The north shore forms the south side of Port Madison. It is a little over nine miles long northwest by north and three and a half miles wide. It is moderately high, has some high bluffs along the eastern shore, but this is broken by several indentations forming anchorages and harbors. At the north end is the location of the Port Madison mills, already mentioned. The surface is covered with the usual growth of Oregon pine, although much cut out by the loggers. To the westward of the island is a long sound, which, with its arms, is nearly thirty miles long and about one mile wide, with a good depth of water close to the shores. This is Port Orchard.

PORT ORCHARD.

This is the thirteen-mile long sound on the west side of Bainbridge Island. It has an average width of one mile, with a narrow and straight entrance from Port Madison on the north, and the crooked entrance on the south known as Rich's Passage. Once inside the sound the navigator can see no direct outlet, and it looks like a long lake. The shores of the sound are moderately low and covered with Oregon pine to the edge.

The usual entrance was by the Agate Passage from the southwest angle of Port Madison. This channel is somewhat crooked, but it has three and four fathoms of water in it. On the western side of this entrance are some white patches of beach, formed by clam-shells. Both sides of the entrance are bluffs. Vessels not well acquainted with the channel must enter under easy sail and keep a lead going on each side of the vessel to ascertain where the deepest water lies. After getting through give the point one mile off the western side a berth of nearly half a mile to avoid a shoal which makes out east from it. Thence it is plain sailing in fifteen to twenty-five fathoms of water. After passing the first point on the west an arm opens to the northwest, and many vessels have loaded there with spars. Ten miles up the southern channel is another arm, five miles long, stretching to the west-northwest. Inside, this body of water is irregular in shape, and the broad basin is known as Dye's Inlet and the southern arm as Ostrich Bay. The depth of water ranges from three to seventeen fathoms, and at the upper basin are found beds of oysters. A very extensive steam saw-mill was erected on this arm, but was long since burned down. In coming out of Port Orchard vessels should not trust the southern entrance. Rich's Passage, but leave as they entered. We worked through the southern pass with the surveying brig *Fauntleroy* and found it a risky undertaking. The wind may leave the vessel or head her off at any moment. The chart will give all the information needed about the direction and depth of the water. (See remarks under "Restoration Point.") To obtain the time and height of every tide throughout the year, consult the U. S. Coast and Geodetic Survey Tide Tables for the Pacific Coast.

SHILSHOLE BAY.

The eastern side of the inlet or sound directly abreast of Bainbridge Island has a sharp, low, projecting point which reaches nearly a mile into the channel beyond the general trend of the shore. South of it the shore leads into Duwamish Bay; north of it there is a broad shallow bight stretching two and a quarter miles northward to Meadow Point. The shore of this northern stretch recedes to the eastward about half a mile, and near the middle it is broken by the *Shilshole Creek*, which drains Union Lake three miles to the eastward and eleven and three-fourths feet above the high-water mark of the sound. *Meadow Point* is a small, low, grassy point, with a marshy lagoon inside, and higher ground rising behind that; and low bluffs to the north and south, some bright and broken, others covered with alders, etc. West Point is low, and grassy, and sandy, with marsh inside, and has the Light-house upon the extremity.

Under the broken cliffs between the Shilshole Creek and West Point the low-water beach is shingle, but outside of three fathoms the bottom is sticky. On the line between the two points the depth midway is twenty-five fathoms, directly abreast the opening of the creek. One-third of

a mile inside this line is the three-fathom curve. The shoal water makes out farthest at the mouth of the creek. Two feet can be carried into the mouth of this small stream at low water.

Anchorage may be had in Shilshole Bay in fifteen fathoms of water over sandy bottom, with the Light house bearing south distant three-fourths of a mile.

There is a good anchorage in seven to ten fathoms about two hundred and fifty yards from shore between West Point and Shilshole Creek, and good protection from southeasters.

It has been proposed to excavate a channel from the sound to Union Lake, and thus have a safe port in fresh water. Locally this bay is known as Salmon Bay. For tides see U. S. Coast and Geodetic Survey Tide Tables.

THE WEST POINT LIGHT-HOUSE.

This Light is on the point at the northwest part of Duwamish Bay. It is a low, grassy, sandy point; stretches a quarter of a mile from the gently rising ground immediately behind it, and covered with large straggling pines. The south shore of the point lies east and west, and the north shore northeast by east. The greater part of the point is taken up by marsh, with an opening to the sound on the north shore. The three-fathom curve is only one hundred and fifty yards outside the point, and the bottom drops away rapidly to twenty-five and thirty fathoms of water in a quarter of a mile.

Both for purposes of general navigation and for the entrance to Seattle Harbor, a Light-house has been established on the extremity of West Point.

The outermost structure is a one-storied square tower twenty feet high and ten or twelve feet square, with a watch and oil room attached. The tower is painted white, and the dome and the parapet of the lantern are black.

The illuminating apparatus is of the fourth order of the system of Fresnel, and was first exhibited November 15, 1881. From sunset to sunrise it shows a *flashing light, alternately red and white every ten seconds.* In October, 1885, we timed the light as follows: White flash for two and a half seconds; eclipse six and a half seconds; red flash two and a half seconds; eclipse six seconds; and repeat in same order.

The height of the focal plane is twenty-seven feet above the mean level of the sea, and under favorable conditions of the atmosphere should be seen at a distance of ten and a quarter miles.

The geographical position of the Light-house, as given by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 39′ 43″.3 north.
Longitude	122° 26′ 03″.1 west.
Or, in time	8h 9m 44s.2.

The Light is therefore only one and a half seconds west of San Francisco.

THE FOG-SIGNAL AT WEST POINT.

The fog-signal structure is a wooden building, one-story high, painted white, with a brown roof. It stands about twenty yards in the rear of the Light-house.

The steam fog-signal is a Daboll trumpet, which is sounded during thick and foggy weather; it gives *blasts of five seconds duration, with intervals of twenty-five seconds.*

It was first sounded February 7, 1887, when the bell-tower was removed.

Inside of the Light-house and the fog-signal house is the keeper's dwelling, a wooden house of one and a half stories, painted white with green blinds; beyond these buildings is the woodshed, etc. This point is sometimes known as *Sandy Point* by the steam-boat captains.

DUWAMISH BAY.

On the eastern side of the sound and under the south side of West Point, Duwamish Bay opens with a width of five and a third miles, contracts rapidly to two and a third miles both from the north and south shores, and then continues with that width for two miles, to the edge of the extensive flats at the mouth of the Duwamish River. The entrance to the bay opens northwest to the northwest and lies directly abreast Eagle Harbor and Blakely Harbor, which are on the west side of the sound.

This broad sheet of water is important as forming the harbor of Seattle, a town which has grown with large commercial and productive interests.

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Dolphin Point.
Vashon Island.
Colvos Passage.
Restoration Point.
Point Vashon.
Blake Island.

Point Jefferson.
Puget Sound.
West Point, NW. by N. ½ N., 5¼ miles.
Whidbey Island.
Battery Point, ¼ mile distant.

Point Jefferson.
Puget Sound.
Battery Point, NW. by N. ½ N., 3¾ miles.
Bright, low, beach bluff.

BATTERY POINT.*

The south point of the entrance to Duwamish Bay is Battery Point, which is five and a third miles south twenty-eight degrees east (S. 28° E.) from West Point Light-house, already described. As seen from the northwest just before reaching West Point, Battery Point is seen as a moderately low, bare, nearly flat-topped mound, with a steep cliff sixty feet high towards the water, and a short, low point outside of it, which is the real point. Inside of the curiously shaped mound there is a low neck with large straggling pine trees, and behind this the land again rises. When seen from the southeast beyond Brace Point the same characteristics are seen with one lone pine trunk standing in the middle of the gently sloping surface of the mound. This tree shows now only the bare trunk; formerly it was a good mark.

On the north side of Battery Point a vessel anchoring in twenty fathoms of water over sandy bottom can not have a greater scope of chain than thirty-five fathoms without being too close to the shore. When we anchored there in thirteen fathoms and veered to twenty-five fathoms of chain, the vessel's stern was in two and a half fathoms of water. The beach is smooth and very regular, being composed of sand and gravel.

From Battery Point we have the following bearings and distances to important objects:

Point Pully on the east side of the Sound with Brace Point just inside the range	S. 33° E.	7¾ miles.
Point Robinson Fog-signal, on western side of the sound	S. 31° E.	11⅛ miles.
Point Vashon	S. 11° E.	4½ miles.
Restoration Point	S. 81° W.	2½ miles.
West Point	N. 27° W.	5⅛ miles.

Battery Point Light.—A *fixed white light*, lens lantern, has been suspended from an arm on a white post, which is twelve feet high. The lantern is about fifteen feet above sea level. It is situated ten yards from high-water mark, and about seventeen yards from the low-water end of the spit.

It is five and a quarter miles S. 29° E. from the West Point Light-house.

It was established December 12, 1887.

Duwamish Bay, continued.—On the south side of the high, wooded bluff commencing just east of West Point there is a long, bright, horizontal cut, which is half way between the water and the top; it is a good landmark. This bluff is named Magnolia Bluff, and it makes a long, rounding sweep for one and a quarter miles to the southeast by east from the Light-house. It reaches nearly four hundred feet elevation, and continues with decreasing height for one and three-eighths miles nearly east to a sharp recession of the shore, which makes in to the northward for three-fourths of a mile. This recession forms a moderately wide cove, bare at low water, called *Smith's Cove.* Under the foot of Magnolia Bluff and three-eighths of a mile southeast from its highest break, there is a large granite, erratic bowlder inside the low-water line, and locally known as the *Four-Mile Rock.* The broken bluff abreast this rock is two hundred and twenty feet high, and the land behind it rises to nearly four hundred feet. This long bluff was named Magnolia Bluff in 1856.

From the western side of Smith's Cove the shore for three miles, to Seattle, is nearly straight, and runs east-southeast. It is comparatively low, but the land behind rises rapidly to the top of the ridge between this bay and Union Lake, the extreme height being four hundred and forty feet.

After rounding West Point a vessel keeps about half a mile off the northern shore, and the general course to Seattle is east by south, and the distance is five and a quarter miles from the light on West Point.

DUWAMISH HEAD.†

On the south shore, inside of Battery Point, lies Duwamish Head, which is distant therefrom one and seven-eighths miles north twenty-nine degrees east (N. 29° E.), and four and a half miles south forty seven degrees east (S. 47° E.) from West Point Light-house. The shore between Battery Point and this head is nearly straight, with deep water close under the shore for half the dis-

* Named by the U. S. Coast Survey, 1856. The English Admiralty Chart, No. 1911, with corrections to 1865, calls this Robert's Point, although there is the same name at the mouth of Fraser River. The Indian name is Me-kwah-mooks.

† Named by U. S. Coast Survey in 1856.

tance, when the low-water line increases to two hundred and fifty yards in breadth. At the head the shore turns sharply to the southeast for two or three miles, of which the first mile has deep water to the edge of the broad flats at the mouth of the river.

The head itself is steep, about three hundred and twenty feet high, and the summit is partially covered with the Oregon pine. The western side of the head is broken to a height of two hundred and sixty feet at the highest point, and two hundred feet at the extreme point. On the inside it is very steep, but not broken for a quarter of a mile. The beach at low water stretches out one eighth of a mile to the north-northwest, when the shoal water is continued to the three-fathom line, which is six hundred yards from the bluff. Then the drop to twenty fathoms is within two hundred and fifty yards. Along the east face of the bluff the water is very deep close in shore. On the eastern side of the head is the town of *Freeport*, with an extensive saw mill and wharfage facilities. Seven-eighths of a mile inside the head is a small settlement, called O'Connor, which is on the outer edge of the great flats.

HYDROGRAPHY OF DUWAMISH BAY.

The depth of water inside the points of entrance is a little more than one hundred fathoms, over muddy bottom. On the line across the bay from Duwamish Head north northwest the greatest channel depth is eighty-five fathoms, and from Duwamish Head to the shore north-northeast under the west side of Seattle the depth is seventy fathoms, with bold water close to the shore. Off Magnolia Bluff the three fathom line is one eighth of a mile off shore. Off the western part of the town of Seattle it is only one hundred yards distant. The general character of the bottom is good, except to the southwest of Duwamish Head.

But the southeastern part of the bay, and southeast of a line two miles long, drawn from a point three-fourths of a mile south southeast from Duwamish Head to the southeast part of Seattle, there is a very extensive mud flat from one to one and a half miles broad, forming the delta of the Duwamish River. The fifteen fathom line is less than two hundred yards outside the edge of this flat, which is bare at low water.

There is an extensive system of wharves in the extended frontage of Seattle, and steamers and vessels go directly there to discharge and load. These wharves reach out to three and four fathoms of water. Vessels anchoring off the town find the best ground near the southern part of the town, where a depth of fifteen to twenty fathoms over muddy bottom is found four hundred yards outside the wharves. It drops off suddenly from fifteen fathoms.

When a sailing vessel is getting under way from her anchorage off Seattle the usual southerly wind compels the first tack to the southward towards the edge of the great mud flat. It is at high water this flat can not be distinguished, and the lead must be kept going. When a depth of fifteen fathoms is struck a vessel must go about, for the water shoals to three fathoms very suddenly, and keeping on would soon bring her up on the flat. If the current be ebb, vessels bound out of the sound should stand well into the inlet; and if bound up the sound, should work over under and around Duwamish Head to Battery Point. If the current be flood, vessels bound out of the inlet should work under the north shore and close to West Point; if bound up the sound they should work under the north shore about three and a half miles, to Magnolia Point, or to Four-Mile Rock, or until they can fetch well clear of Battery Point. If calms prevail, the tugs are employed to tow vessels in or out. The tug service throughout the Sound is good.

Tides at Seattle.—The times and heights of the tides are very irregular, but can be computed approximately from the table given on the chart of Seattle Harbor. The shortest method is to consult the annual publication of the U. S. Coast and Geodetic Survey tide tables for the Pacific Coast.

DUWAMISH RIVER.

This is a moderately large stream heading in the Cascade Range of Mountains, and running in a general course to the northwest, to Duwamish Bay. A tributary from the north drains the extensive lakes, Washington and Sammamish; and in its valleys and at the lakes there has been developed extensive deposits of coal and iron. The whole country is well wooded. The great flats at the head of Duwamish Bay are formed from the sediments brought down by this river.

SEATTLE.

This is the county seat of King County, and has a population of about fifteen thousand people. The industries are varied, embracing the great lumber supplies, coal, iron, ship-building, agricultural products, etc.

In 1884 thirty-four steam-boats were built at Seattle; they were generally small, and the largest reached four hundred and seventy-two tons burden. Here we find an extensive series of wharves, docks, and coal-bunkers. It is reported by the chamber of commerce that there was exported from this county in 1884 one hundred and twenty-four million feet of rough and dressed lumber. There are between forty and fifty steam-boats of various sizes which belong to this port, and the ocean steamers make their regular connections; there is rail connection thence to Oregon and the east. The city of Seattle reaches the shores of Lake Washington, which is less than two miles from Duwamish Bay. This lake is sixteen miles long and two miles wide.

The State university is situated in Seattle.

The town of Seattle was attacked by a small body of Indians in 1855, but the assault was repelled by the United States steamer *Massachusetts*.

On the 7th of June, 1889, the whole of the business part of Seattle was destroyed by fire, but such is the activity of those of the great commercial, mining, and industrial interests of this city that the destroyed part is being built up in a much more substantial manner than before.

Duwamish Bay was called Elliott's Bay by the United States Exploring Expedition in 1841, but the present name is that by which it is invariably known, and was adopted from the name of the tribe of Indians inhabiting its shores. The name of the town is derived from that of the chief, Se-at-tle.

*Skiff Point.**—This is the first point, three and one-fourth miles south of Point Monroe, on the west side of the sound. It is directly abreast of West Point Light-house, where the channel is two and three-fourths miles wide. The point is moderately broad and rounding and projects fully half a mile into the channel. It is low at the water-line and rises regularly to a ridge to the westward; the bluff to the north-northwest is steep and moderately high. The water off the point is quite bold. Under the south shore of this point is Murdens Cove.

*Murdens Cove.**—This is a wide recession of the western shore of the sound, just under Skiff Point; the shore sweeping to the southwest for nearly a mile and then southeast by south for a mile and a half, to Yemoalt Point. The northwest shore is low; the south shore has steep clay cliffs. The inner part of the cove has shoal water, but inside of the line of the two points there is anchorage in ten to fifteen fathoms.

Yemoalt Point is the southern point of Murdens Cove and lies on the west side of the sound, two and seven-eighths miles south thirty degrees west (S. 30° W.) from West Point Light-house. It is a low point with gently rising land behind it. The cliffs to the northward and southward are moderately high and broken. There is deep water off the point.

Eagle Harbor.—This is a narrow, deep indentation of one and three-fourths miles into the eastern shore of Bainbridge Island, and on the western side of the sound. It opens directly towards Duwamish Bay. At the mouth, the entrance is barely half a mile wide, and the three-fathom curve extends nearly a mile into the harbor. A depth of eight fathoms is four-fifths of a mile inside from the north point. The north side of the entrance is *Wing Point*; it overlaps the south side a quarter of a mile. It is a very narrow, low point lying three and a half miles south twenty-two degrees west (S. 22° W.) from West Point Light-house, and two and a quarter miles north thirty-three degrees west (N. 33° W.) from Restoration Point. It is nearly in the line of the latter point, Yemoalt Point, and Skiff Point.

In 1856 we found a long pebbly ledge making out three hundred or four hundred yards southeast from Wing Point, but the late surveys have developed a direct connection from this ledge to the Blakely Rock, running nearly parallel with the shore. For three-fourths of a mile from the point on a line to Blakely Rock there is found as little as two and a half fathoms of water. Outside of this ledge the bottom drops very suddenly to fifty fathoms. Vessels bound into Port Blakely must not haul too close to the shore until they are within half a mile of Blakely Rock. If a large vessel were bound into Eagle Harbor she would have to enter from the southward close under the shore and pass through the narrow but deep channel between the ledge and the shore.

* Named by the U. S. Coast Survey in 1856.

RESTORATION POINT.

When coming up the sound a vessel two miles northwest of West Point sees Restoration Point on the western side of the sound and almost abreast of Battery Point. It is then made out as a low black line stretching out from the western base of a flat, rounding hillock, heavily wooded, with a neck behind it, and then gently rising ground with scattered trees on the neck and rise. Over and four miles beyond Restoration Point is seen the line of moderate high ground of Point Southworth at the entrance of Colvos Passage.

Restoration Point is the southeast point of Bainbridge Island, and is the mark for making Port Blakely; and also for the southern entrance into Port Orchard. It is five and one-eighth miles exactly south from West Point Light-house.

Restoration Point is in some respects very peculiar; no other point in these waters, except Battery Point, presents the same formation. For three hundred yards it is flat, about ten feet above high water, and has a foot depth of soil covered with grass, over a limestone rock, upheaved nearly on edge, the direction of the strata pointing toward Battery Point, or a little south of it. Inshore the land rises sharply about one hundred feet, its sides covered with grass, and the summit with fir trees. Around the whole southeast face of the point these peculiarities exist. On the upper levels of the high land adjacent our party found small lakes of water.

Decatur Reef.—From the extremity of the point a ledge, bare at low tides, makes out into the sound for three hundred yards, but the depth of water is six fathoms one hundred yards off the extremity, and sixteen fathoms at a quarter of a mile. On the tail of this ledge the United States sloop of war *Decatur* struck in 1855, and it has been named after that vessel. South-southeast of the point anchorage may be had in fifteen fathoms of water over sticky bottom, a quarter of a mile from shore, or, as a rule for finding anchorage, bring the Blakely Rock north of the point to range just over and inside of it. Kelp exists along the southern face.

Between Restoration Point and Battery Point the greatest depth of water in the sound is one hundred and thirty-seven fathoms over a bottom of black mud. The mean rise and fall of the tide is seven and a half feet, and the extreme range is over fourteen feet; the currents are strong.

The geographical position of the triangulation station of the Coast Survey upon this point is—

Latitude	47° 35′ 05″.8 north.
Longitude	122° 28′ 15″.2 west.
Or, in time	8h 09m 53s.0.

From Restoration Point we have the following bearings and distances to important objects:

Point Jefferson, Port Madison	N. 20° W.	10¼ miles.
West Point Light-house	North.	5¼ miles.
Duwamish Head in line to Seattle	N. 59° E.	3¾ miles.
Battery Point, south side Duwamish Bay	N. 82° E.	2½ miles.
Point Robinson Fog-signal	S. 41° E.	12⅞ miles.
East Point of Blake Island in range with the west side of Point Vashon, Colvos Passage	S. 21° E.	2⅝ miles.
Point Orchard, southwest side of entrance	S. 39° W.	2½ miles.

Vancouver anchored under this point in 1792; found large numbers of Indians located near and first called it Village Point, but changed it to its present name in commemoration of the day on which he anchored. From this place his boats explored all the waters adjacent.

PORT BLAKELY.

On the west side of the sound is this moderately deep indentation in the eastern shore of Bainbridge Island on the north side of Restoration Point, which is the mark for the entrance. The actual length of the port is seven-eighths of a mile, and it carries three fathoms of water for five-eighths of a mile inside the opening, which is three eighths of a mile wide. The general direction of the port is west by south. The north shore lies east by north and west by south, and the south shore east and west. The approaches to the port extend out one mile farther, to the extremity of Restoration Point.

Blakely Rock.—In this outer road there is a ledge of rock nearly one-eighth of a mile in length, and a large part of it is above water. The middle and highest part, which is fifteen feet above water, is five-eighths of a mile north twenty-seven degrees west (N. 27° W.) from the extremity of Restoration Point. There is shoal water and foul ground for two hundred and sixty yards to the

north-northwest of the rock, with a bank of kelp extending out to seven fathoms of water all around it. On the south side there is deep water close under it with a passage between it and the north shore of Restoration Point, three-eighths of a mile wide; this passage has twenty-five fathoms of water, with sticky bottom. The rock bears north eighty-one degrees east (N. 81° E.) from the north point of the entrance to Port Blakely, distant over five-eighths of a mile. There is rocky ground close off the north point, but marked by kelp out to six and seven fathoms. The passage between this point and Blakely Rock is half a mile wide between the ten-fathom curves and has twenty-six fathoms of water over sticky bottom, so that vessels from the north always pass between the rock and the north point. But the approach from the north is over the long ledge which runs from Wing Point to the Blakely Rock. A little less than half a mile north of the Blakely Rock this ledge can be crossed in nine fathoms of water, sandy bottom, but thence to Wing Point the depth of water on the ledge decreases, and as little as two and a half fathoms is found, with deep water inside. Outside of the ledge the depth increases rapidly to fifty fathoms.

The usual *outer anchorage* of Port Blakely is south thirty-three degrees east (S. 33° E.) from the north point of the entrance, a little nearer the southern shore, in thirteen fathoms of water, over sticky bottom. The deepest water in the entrance is eighteen fathoms. The inner anchorage is a quarter of a mile to a third of a mile inside the north point and rather nearer the south shore than the north, in nine and a half fathoms of water, over hard bottom. Here the width apart of the three-fathom lines, under the north and south shores, is only three hundred yards; and that width decreases farther in.

At the inner end of the harbor is one of the largest saw mills of the country; it has an average daily output of over two hundred thousand feet of lumber and has reached an output of three hundred and fifty thousand feet of lumber in one day. The mill is under the north shore.

Here also is an extensive ship-building establishment. Between 1881 and 1887 there were built here twenty-two vessels (including a United States revenue-cutter), aggregating nine thousand three hundred and sixty-nine tons; the largest vessel was seven hundred tons burden; and at this writing there are three vessels on the stocks.

The geographical position of the outer end of the ship-building establishment has been determined by the U. S. Coast and Geodetic Survey as follows:

Latitude	47	35	50″.5 north.
Longitude	122	29	53 .0 west.
Or, in time	8h	0m	59s.5

The place is therefore 16s.8 west of the San Francisco astronomical station of the Coast and Geodetic Survey.

In December, 1883, the magnetic variation was 22° 05′ east, and in January, 1885, the limit of the variation had been reached.

Tides at Port Blakely.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XVIh 50m.

To obtain the time and height of every tide throughout the year, consult the Pacific Coast Tide Tables, published annually by the U. S. Coast and Geodetic Survey.

The extreme range of tide observed during the observations here was seventeen feet.

Port Blakely was named by the United States Exploring Expedition in 1841.

South of the contraction of the sound between Restoration Point and Battery Point it opens to a width of nearly six miles for about five miles north and south. This expansion is, however, contracted by Blake Island in the southern part. Into the northwest angle of this broad area Rich's Passage, the southern entrance of Port Orchard, opens. In the southern part, one and a half miles from Blake Island, is the north entrance to the Colvos Passage. To the southeastward opens the broad and main channel of the sound. The shores on the east and west belong to the main land; the latter being on the Great Peninsula between the sound and Hood's Canal. The land between the Colvos Passage and the main channel of the sound is Vashon Island.

Rich's Passage into Port Orchard is the southern entrance thereto; it is two and a half miles southwest from Restoration Point. It is five-eighths of a mile wide at the mouth, and runs northwest by west for nearly two miles, with deep water on the southwest side, and *rocks* under the northeast shore, and about half a mile inside the east point of the entrance. Then the channel turns sharply to the southwest for one mile, into Port Orchard. The south point at the sharp turn is *Glover Point.* The depth of water is over ten fathoms, except just east of Glover Point, where the ten-fathom curve from the north side crowds well over to the south point. Beyond Glover

Point the least depth in mid-channel is ten fathoms. The whole channel has rocky bottom; the currents are strong and irregular; and the wind is light, variable, and uncertain at the sharp turn, and apt to leave a vessel where the channel-way is only two hundred yards wide.

Point Orchard.—This is the low rocky point at the south side of the entrance to Rich's Passage into Port Orchard. Behind it the land rises into a moderate hillock with a low neck to the southward, and a cove inside the passage to the west-northwest. Off this point the water is deep.

BLAKE ISLAND.

This island guards the northern entrance to the Colvos Passage. It is about one mile in extent, not high, but covered with wood, except at the eastern point,* which is low and pebbly. The eastern side of the island is low, with straggling trees, and the land rises to near the western side. When a vessel is going northward, and is clear of Vashon Island, the Jupiter Hills show over Blake Island, with Mount Constance to the southward.

The eastern point of this island lies two and five-eighths miles south twenty-one degrees east (S. 21° E.) from Restoration Point. There is deep water generally around the island, the twenty fathom curve being close under the south and west sides and off the east point. Off the north side the ten-fathom curve makes out one-third of a mile towards the broad shore of Restoration Point, and there is anchorage in seventeen to eighteen fathoms close under the east point, with bottom of soft mud.

ALLEN BANK.

Stretching from the southeast face of Blake Island there is a bank with less than twenty fathoms of water reaching all the way across to Point Vashon, at the northeast part of the entrance to the Colvos Passage. The bottom is variable; in some places mud, and in others hard sand. The depth is greater nearer the island and decreases to as little as eight and a half fathoms one mile north two fifths west from Point Vashon. At our anchorage upon it in eleven fathoms, the south end of Blake Island bore west three-fourths north (W. ¾ N.) three-fourths of a mile distant; and the northwest point of Vashon Island, south half east (S. ½ E.) one mile distant. Between this anchorage and the island the depth increased to eighteen fathoms, over soft mud. This bank has proven of great service to vessels losing the wind and having adverse currents; the more especially when the Colvos Passage was the channel used by all vessels.

We discovered and named this bank in 1857.

South of Battery Point, on the eastern side of the sound, the shores of the sound have generally a narrow belt of kelp in the latter part of summer and autumn, but it is torn away by the storms of the winter and spring.

POINT WILLIAMS.

This point, on the east side of the sound, is the first small, low, sandy and gravel point, two and seven-eighths miles southeast two-thirds south (SE. ⅔ S.) from Battery Point. The land rises rapidly behind it, and it is pine covered. Between it and Battery Point the shore retreats one and a half of a mile to the eastward, and is nearly straight. It is not a notable point to vessels going up or down the sound, because it retreats inside the line of Brace Point. It is the north point of Fauntleroy Cove. The water off this point is seventy-five fathoms deep within one hundred or two hundred yards; in mid-channel it is one hundred and seventeen fathoms.

BRACE POINT.

This point is on the east side of the sound abreast the north end of Vashon Island, and four miles south side of Fauntleroy Cove. It is a small, low, sandy, gravelly point, backed by rapidly rising ground covered with Oregon pine. It is three and three fourths miles south thirty-five degrees east (S. 35° E.) from Battery Point, and eight miles north twenty nine degrees west (N. 29° W.) from Point Robinson Fog signal. In running north, before a vessel reaches Point Pully, Brace Point is seen as a moderately high-wooded point just to the eastward of Battery Point; the land behind the first rise falling a little and then rising to the eastward. The depth of water off this point is seventy-five fathoms within one hundred or two hundred yards, and in mid-channel over a hundred fathoms.

This point was named by the U. S. Coast Survey in 1857.

* Called Tatuch by the Indians.

FAUNTLEROY COVE.

This slight indentation on the east side of the sound is between Point Williams on the north and Brace Point on the south; the distance apart of these points is a little over three-fourths of a mile, and the shore recedes a quarter of a mile to the eastward. The immediate shore is low, except under Point Williams, where the bluff reaches the water. We found good anchorage here in ten and twelve fathoms of water; but when on the range of the two points the depth increases and the bottom drops away very suddenly outside. Fresh water is easily obtained in the vicinity. We named this cove in 1857.

The extent of shore line of Admiralty Inlet from the entrance to the north end of Vashon Island abreast Brace Point is two hundred and forty one miles.

VASHON ISLAND.

This is the largest island in the waters of Admiralty Inlet and Puget Sound. Vashon Island is high, with steep shores, covered with wood and undergrowth. Its surface is marshy in many parts that are quite elevated. It is eleven miles in length, north and south, and ranges from one to six and a half miles in breadth. It may be considered as lying in a great expansion of the sound, twelve or fourteen miles long and ten miles wide. The northern end is in latitude 47° 30½′, and the southern end in 40° 19¾′. The western side of the island has a general direction north and south, and it forms the eastern side of the Colvos Passage. The eastern side of the island has a general southeast direction for eight and a half miles, to Point Robinson Fog-signal, and then a southwest direction for six or seven miles, to Neill Point. Between the east and southeast sides of the island and the mainland is the two mile wide channel of the main inlet reaching as far as Commencement Bay, upon which lies the city of Tacoma. The shore line of the island is forty-seven miles, and around the shores of the island there is a belt of kelp in the latter part of the summer and autumn, but it is torn away by the storms of the winter and spring.

The easternmost projection of the shore of Vashon Island is a curiously shaped peninsula, named *Maury Island*, four and a half miles long and one and a half miles wide, lying underneath the southeast part of Vashon Island. This peninsula is high, wooded, and has compact, bold shores. But on the northwest part it is connected with Vashon Island by a low sandy neck of land only one hundred yards wide. The bight at the north side of this connecting neck is *Tramp Harbor*, broad open to the north. The deep bay on the south side of the neck and between Vashon Island and Maury Island is three and a half miles long and over half a mile wide, with five to ten fathoms of water, over gray sand, and mud at the north extremity. This bay is an excellent shelter at two miles inside the entrance, with good water and good holding ground. It was named *Quartermaster's Harbor* by the United States Exploring Expedition, 1841.

The English Admiralty chart, No. 1911, erroneously notes this peninsula as an island with nine feet of water at the neck. It then received its present name.

In the earlier years of the navigation of these waters by large sailing vessels when there were no steam tugs, the Colvos Passage was universally used, but in recent years the development of Tacoma and the use of steam tugs have changed the whole traffic to the main channel between Vashon Island and the main shore to the eastward. In this channel the currents are not strong, the chances for anchoring are few, and it is sometimes calm, while there is a fine breeze blowing through Colvos Passage.

The main channel on the east side of this land is the best to work in with a head wind.

Vashon Island was named Vashons Island by Vancouver in 1792.

POINT VASHON.

The northern point of Vashon Island is named Point Vashon; it is a high, rounding bluff, covered with Oregon pine, forming the northeast point of the entrance to Colvos Passage. It lies four and one-half miles south twenty-four degrees east (S. 24° E.) from Restoration Point, and nine and one-fourth miles south by east (S. by E.) from West Point Light-house.

From this point Allen Bank runs towards the southeast point of Blake Island, with a convex curving to the northeast. On the western side, where the entrance to the Colvos Passage is one mile wide, the depth is fifty-eight fathoms; along the shore, which runs nearly east by south for one mile, to Dolphin Point, the twenty-fathom line gradually approaches the shore.

Anchorage.—Broad off the north face of Vashon Island there is good anchorage from one-quarter to one-third of a mile off shore, with protection from southeasters.

The geographical position of this point, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 30′ 35″.4 north.
Longitude	122° 28′ 29″.0 west.

This point was named by the United States Exploring Expedition in 1841.

DOLPHIN POINT.

This is the eastern point of the north end of Vashon Island and in the main channel. It is a high, sharply rising bluff, covered with Oregon pine to the base, where there is a clump of deciduous trees at the water's edge forming a little projection. It is four and three fourths miles south six degrees east (S. 6° E.) from Battery Point. The channel is here two and a quarter miles on a southwest bearing from Brace Point, and widens a little to the southeast by a receding of the shore on each side. Under Dolphin Point the shore runs a mile to the south and then two miles to the southeast by east, to Point Beals. Under Dolphin Point the depth of water is very great, and in the bight to the southward the depth is still greater. The twenty-fathom curve is close to the point, and the mid-channel depth is one hundred and eight fathoms.

Good anchorage is reported, however, in from seven to fourteen fathoms.

In the bight between this point and Point Beals there are three rocks above water close under the shore. The southernmost one is on the northwest side of Point Beals, and is fourteen feet above water; the other two in the bight are seven and six feet high.

From Dolphin Point we have the following bearings and distances to important objects:

West Point Light-house	N. 17° W.	9¾ miles.
Point Pully	S. 62° E.	4½ miles.
Robinson Point Fog-signal	S. 45° E.	7⅞ miles.

POINT PULLY.

This point lies seven and three-fourths miles south thirty-three degrees east (S. 33° E.) from Battery Point, and four and one-fourth miles from Brace Point, just inside the same course. Between Brace Point and Point Pully the shore retreats more than a mile to the eastward, with low shores bordering the higher, pine-covered land. Two or three small streams enter this bight. The depth of water in this bight is very great. Point Pully projects more than half a mile west southwest into the sound; it is sharp and narrow.

It is a low point with a flat, rounding hillock behind it, and upon which stands one large high tree in the middle and two or three smaller ones straggling on each side. When a mile or two to the southward of it, the farthest clear point on the east side of the sound is Battery Point, treeless, with Brace Point under it. When seen from the northwest it shows almost the same features projected on the higher and distant land to the southeast.

The extremity of this point is sand and gravel, and it pitches sharply off into very deep water, the fifty-fathom curve lying but a short distance outside, with one hundred and twenty-five fathoms in mid-channel. There is deep water on the north and south sides; strong currents sweep past.

Under Point Pully to the eastward the bluff breaks down to brown slopes without trees, and at one mile from the point a stream comes in from a moderately broad valley. Off this valley a flat makes out some distance, with deep water at its edge.

The geographical position of Point Pully was determined by the U. S. Coast and Geodetic Survey, as follows:

Latitude	47° 27′ 03″.2 north.
Longitude	122° 23′ 46″.6 west.

From Point Pully we have the following bearings and distances to important points:

Point Robinson Fog-signal	S. 27° E.	3¾ miles.
Dolphin Point	N. 62° W.	4½ miles.
Restoration Point	N. 47° W.	9½ miles.
Battery Point	N. 33° W.	7⅞ miles.

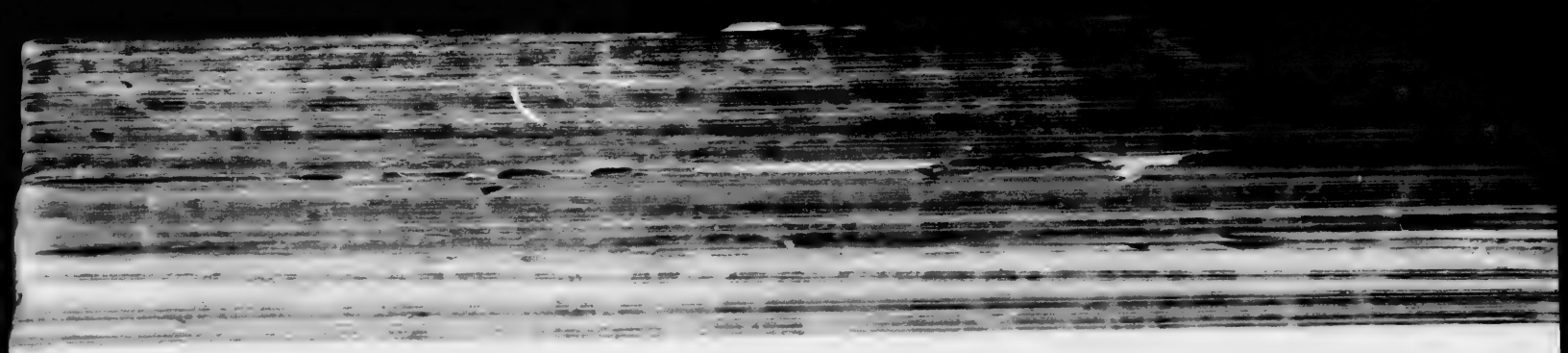
Abreast of Point Pully the channel is two and one-third miles wide.

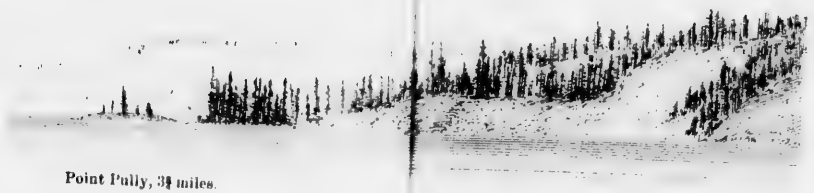
This point was named by the U. S. Coast Survey in 1857.

Point Monroe, NW. ¼ N., 12 miles.

Mount Rainier, 14,344 feet, SE. by E., 46 miles.

Point Pully, SE. ¼ S., 4 miles. Puget Sound. Point Robinson.
Fog-signal, SE. by S., 7¾ miles.





Point Pully, 3⅜ miles.

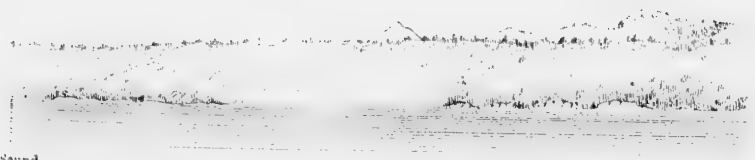
Restoration Point, NW., 12¼ miles.

Puget Sound.

Battery Point, NW. by N., 11¼ miles.

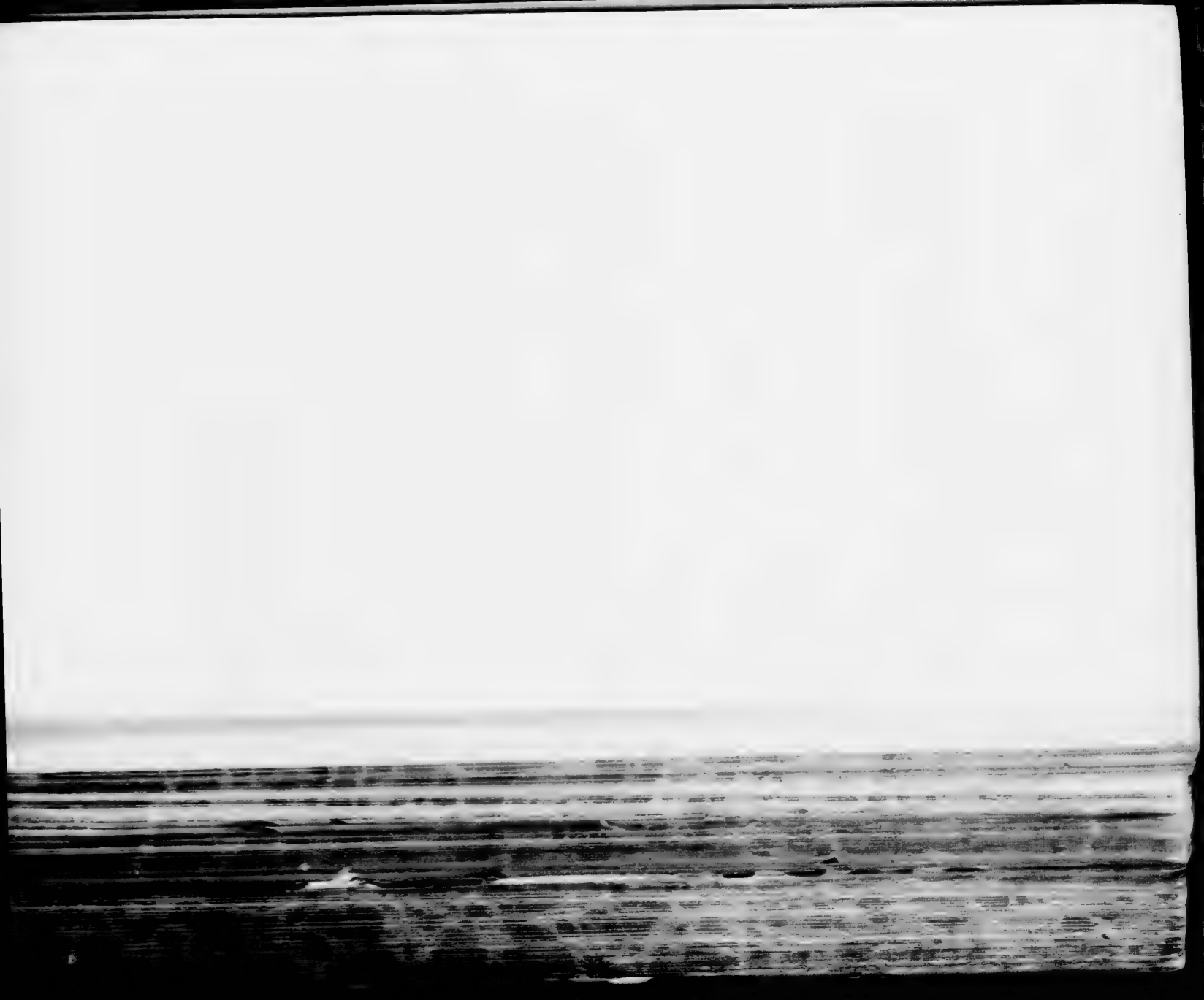
Brace Point, 7⅜ miles.

Point Robinson, N., 3¼ miles.



Puget Sound.

Mount Baker.



POINT BEALS.

This point, on the western side of the channel, is two and three-eighths miles southeast half south from Dolphin Point, and five and three-eighths miles northwest quarter west from Robinson Point. It is nearly abreast of Point Pully. It is a wooded point, rising gradually to several hundred feet, but it does not project far into the channel. It is on the east shore of Vashon Island, and lies just inside a course from Point Robinson to Dolphin Point. There is deep water close off it, and deep water under the slightly receding shore to the north and to the south. Just on the northwest side of the point there is a rock standing fourteen feet out of water.

POINT ROBINSON.

This is the prominent and noticeable point forming the easternmost projection of Maury Island, which is, however, actually a part of Vashon Island. It stretches well over towards the eastern shore of the channel, which it reduces in width to two miles. The extremity of the point is a low spit one hundred and fifty yards outside the trees, with intervening marshy ground, and then a bluff, which is about thirty feet high and bright on the south side, but covered on the top with trees. The bluff rises to about seventy feet behind.

Upon the point are three inconspicuous houses, being part of the fog-signal buildings. To the northwest of the point the shore runs nearly west for three miles, then with a sweeping curve to the north for one mile to Point Heyer, thence north northwest for nearly three miles, to Point Beals. On the south of the point the bluff shore runs four and one-third miles southwest by south in a receding curve, to Point Piner.

Under the south side of Point Heyer is a broad open bight, called *Tramp Harbor*, with a very low shore on the southern part and nearly connected with the head of Quartermaster's Harbor. In this bight there is anchorage in fifteen to eighteen fathoms of water, over fine gray sand, with deep water, of more than sixty fathoms, on the line between Point Heyer and Point Robinson.

This is a good anchorage, and there is fresh water.

Off Robinson Point the water is very deep; and between this and Point Brown it is said that when the weather is calm there is always a lot of old seaweed and stuff afloat in this part of the sound as if it remained here, and very little current movement.

FOG-SIGNAL AT POINT ROBINSON.

This signal is on the extremity of Point Robinson, on the easternmost point of Vashon or Maury Island, and nine miles from Tacoma.

The fog-signal house and the keeper's dwelling are located on the low gravel point which extends one hundred and fifty yards outside and eastward of the wooded bluff. They are wooden buildings of one story and one and a half stories, respectively, painted white, with green window blinds and brown roofs. The dwelling stands two hundred and thirty-three yards to the southward of the fog-signal.

The apparatus is a twelve-inch steam whistle, which was established July 1, 1885, and is sounded in thick and foggy weather. It gives blasts of *six seconds duration, with intervals of fifty-four seconds.*

The geographical position of the fog-signal, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 23′ 49″.1 north.
Longitude	122° 22′ 21″.2 west.
Or, in time	8h 9m 29s.4.

From Point Robinson Fog-signal we have the following bearings and distances to prominent objects:

Dolphin Point	N. 45° W.	7⅜ miles.
Battery Point	N. 31° W.	9¾ miles.
Point Pully	N. 27° W.	3¾ miles.
Point Brown	S. 8° W.	5½ miles.
Point Piner	S. 30° W.	4½ miles.

Point Robinson Light.—A *fixed red light*, lens lantern, has been suspended from an arm on a white post. The lantern is about thirty feet above sea level. The post is one foot in diameter and twenty-five feet high. It is close to the end of the spit and about ten yards northeast of the fog-signal building.

It was established December 12, 1887.

COMMENCEMENT BAY.

South of Point Robinson the width of the inlet or sound expands to three and a half miles between the southeast face of Maury and Vashon Islands and the main land, with high, bluff, wooded shores on both sides, but on the northwest shore the bluffs are unbroken; on the southeast shore they are broken by small streams entering the sound. In this expansion of the sound the water is deep to either shore, and in the center it is about one hundred fathoms. We have been informed that in calm weather much old seaweed and stuff is found floating in this basin, as if there were little current, because the principal ebb current passes through the Narrows northward through the Colvos Passage.

At the southern part of this basin Commencement Bay opens from the east-southeast, with an entrance of two and an eighth miles between Point Brown on the north side and the main shore east of Point Defiance to the southward. The head of the bay is three miles inside of Point Brown, and somewhat increases its width, but at its head there is a broad and extensive mud flat and low marsh land formed by the deposits brought down by the Puyallup River. This is a large stream coming in from the flanks of the Cascade Range, and nearly parallel with the Duwamish or White River. The north and east shores of this bay are the water boundary of the Puyallup Reservation. On the south shore, well in the bay, are the old and new towns of Tacoma.

Throughout the bay the depth of the water is very great, ranging from eighty-eight fathoms in the middle of the entrance to thirty fathoms close under either shore, and carrying twenty fathoms close up to the edge of the mud flats, which are bare at low water.

No special directions are needed to enter or leave this bay. The anchorage off Tacoma is not good, because the depth of water is too great and increases very rapidly off shore. It is reported that off the saw-mills of Old Tacoma, the mooring buoys have a spring cable carried to the shore to prevent their slipping off into the deeper waters. There is good anchorage under the north shore in the slight recession of the shore beginning three-fourths of a mile east of Point Brown. Half a mile off shore and half a mile east of the highest bright bluff of Point Brown there is a depth of twenty fathoms over brown mud, and the three-fathom line is one hundred yards from the shore. This anchorage is well sheltered from all but the southeasters of winter.

The eddy currents are so very irregular in Commencement Bay that courses to steer by in thick weather are almost useless. There is a peculiar film of whitish water on the surface of the bay during the ebb tides and first quarter of the flood tides; this rarely leaves the bay and is said to come from the glacial waters brought down by the Puyallup River.

When in or off the entrance to this bay the snow-covered summit of the massive Mount Rainier shows wonderfully distinct over the low middle ground at the head of the bay. The mountain is thirty-six miles distant and rises to a height of fourteen thousand four hundred and forty-four feet.

This bay received its present name in 1792 from Vancouver, who thought this the entrance to some large arm of the inlet, on account of the low country of the Puyallup valley up which he was looking. He first saw the mountain when off Gray's Harbor. He gave the mountain its present name, but it is locally known as Mount Tacoma. The Indian name is Taghoma. The Indian name of the bay is Puyallup.

POINT BROWN.

This forms the north point of the entrance to Commencement Bay. On the outermost point to the north it is low and gravelly, with gently rising wooded ground behind a marshy spot near the low point. On the south face of the point the shore rises gradually and irregularly in extensive white clay cliffs from twenty-five feet to two hundred feet high within five-eighths of a mile of the point. The land behind is all covered with Oregon pine. Under the north side of the point there is an Indian shanty and fence close under the trees. There is very deep water one hundred and fifty yards off the point.

The low point one and one-eighth miles north by east quarter east from Point Brown is Dash Point, slightly breaking the general line of the shore to the northeastward. There is a slight bight with deep water between them. Dash point is low for about fifty yards back, when the land rises gradually, and is sparsely covered with trees that are about seventy-five feet high.

From Point Brown we have the following bearings and distances to important objects:

Point Robinson Fog signal	N. 8° E.	5¼ miles.
Dalco Point, southern entrance to Colvos Passage	N. 80° W.	3½ miles.
Point Defiance	S. 80° W.	4½ miles.
New Tacoma	S. 31° E.	2½ miles.

Point Defiance, which is the westernmost point of Commencement Bay, is four and one fourth miles westward of Point Brown; it will be described as the entrance to Puget Sound.

Point Brown Light.—A *fixed white light*, lens lantern, has been placed on a white post. The light is about twelve feet above the sea level. The post is ten feet high, and is about fifty yards from the low-water end of the spit. It is two and three eighths miles north-northwest (NNW.) from New Tacoma.

It was established December 12, 1887.

TACOMA.

The south shore of Commencement Bay is a series of cliffs of variable height, cut by small streams. Behind these cliffs the ground gradually rises to two hundred feet. At Old Tacoma, which lies directly south of Point Brown and is the western of the two towns, the immediate shore is low, but the land rises somewhat steeply behind it. At Old Tacoma there is a large saw-mill, and when we were there last seven or eight large vessels were loading lumber. There are great rafts under the shore. The saw-mill has an average output of two hundred and fifty thousand feet of lumber every twenty-four hours, but it has produced as high as four hundred and twenty-seven thousand feet upon a special occasion.

One mile to the eastward of the old town is the new town of Tacoma, which is the western terminus of the Northern Pacific Railroad. Here the cliffs are a hundred feet high, and behind them the land rises to three hundred and sixty feet in three quarters of a mile. The terrace land between the two towns is cleared and laid out in town lots. This site of New Tacoma is the terminus of the Northern Pacific Railroad, which extends westward from the edge of the great mud flat. Here are situated the large depots of the railroad company, saw-mill, etc. The machine shops of the company are one mile farther up the bay, abreast the mud flats. There is very deep water (eight fathoms at mean tide) close up to the wharves and docks. The shipment of coal is made from this port, and probably exceeds three hundred thousand tons annually. There is a coal chute for loading vessels, and coal bunkers with a capacity of four thousand tons, but no marine railway. Locomotives are used for pushing cars up the incline, which has a length of one thousand feet, and a grade of one hundred and sixteen feet to the mile.

Tides.—The chart of Commencement Bay gives a table for finding the times and heights of the tides. The Corrected Establishment, or the average interval between the time of the moon's passage and the time of high water, is XVI^h 7^m; but this interval may be nearly one hour smaller when the moon's declination is greatest north, and nearly two hours greater when the moon's declination is greatest south. The mean rise and fall of the tide is seven and seven-tenths feet.

To find the time and height of any tide throughout the year, consult the Pacific Tide Tables, published annually by the U. S. Coast and Geodetic Survey. The greatest range of tides during the period of observations was sixteen and seven-tenths feet.

On the rising hillside the town of New Tacoma has a large number of fine buildings, private and public, fine hotel, etc. The population is about eight thousand. The taxable property of the city was assessed at two million seven hundred thousand dollars in 1884. There is communication by steamer with all ports on the sound, British Columbia, and San Francisco. There is also railroad communication direct to the Atlantic States and with Oregon and California. New Tacoma is the county seat of Pierce County, which has a population of about twelve thousand people, engaged in agriculture, lumbering, coal, and other industries. In 1884 the assessed value of the property in the county was four and a half millions of dollars.

COLVOS PASSAGE.*

We have elsewhere mentioned that before the general use of steam-tugs on these waters, and before the development of Tacoma as the terminus of a transcontinental railroad, this pas[illegible] the almost invariably used ship channel for vessels to and from Puget Sound. It is formed [illegible] western shore of Vashon Island and the eastern shore of the Great Peninsula. It is eleve[illegible] half miles long and nearly straight on a course south by east. It has a very regular widt[illegible] mile, with high bluff shores, varied by numerous small low sand points making out a short [illegible] from the face of the bluff, and all having very deep water off them. The mid channel depths are fifty to sixty-five fathoms over fine gray sand and gravel. A vessel may anchor anywhere near either shore if she has room to swing. The best anchorage is under the eastern shore, t[illegible] north entrance, about one and a half miles inside of Point Vashon. There is here a slight [illegible] and breaking down of the bluff, and a vessel will find excellent anchorage in five to ten fathoms of water. This anchorage is known as *Fern Cove*,† and the low point forming the southern shor[illegible] is Point Peter.

There is usually more wind in this passage than in the broad passage to the eastward of Vashon Island, and much stronger currents, while at the north entrance, between Point Vashon and Blake Island, is the anchoring ground of Allen Bank, already described. There are no known dangers in this passage.

Since the building of Tacoma almost all vessels running to the head of the sound, to O[illegible] and other places, go by way of the wide passage between Vashon Island and the easte[illegible] shore. This main passage should be named for reference. Colvos Passage is rarely used [illegible] by tugs towing rafts of logs to the northward, because it affords the most direct ebb cu[illegible] the shorter distance. Sometimes steam boats from Tacoma to Seattle take the Colvos Pa[illegible] account of the stronger ebb current. The distance from New Tacoma to Seattle by the C[illegible] Passage is twenty-six and one-fourth miles, and by way of the wide passage twenty-five and [illegible] half miles.

Looking out of this passage to the northward Mount Baker shows distinctly and very [illegible] fully in clear weather.

Point Vashon, at the north entrance, has already been described.

POINT SOUTHWORTH.

The north entrance of the Colvos Passage is one mile wide between Point Vashon and P[illegible] Southworth, the latter bearing nearly west-southwest from the former. It is low near the [illegible] but rises to a high wooded bluff. It has deep water close under its southeast side, but anc[illegible] may be had off the north face with strong currents.

DALCO POINT.

This is the southwestern point of Vashon Island, where the Colvos Passage open[illegible] southward. The southernmost point of the island is Neill Point, which is nearly a mile [illegible] eastward of Dalco Point. The former point is a moderately high wooded bluff, with a s[illegible] point, being a long rounding shore. It forms the north side of the entrance from Puget [illegible] and Colvos Passage into the broader waters of the sound and inlet to the eastward. A[illegible] it to the south-southwest is Point Defiance, the nearest shore of which is one and one th[illegible] distant. Here the south entrance to Colvos Passage is one and seven-eighths miles wi[illegible] deep waters close under the shores, ranging from twenty to forty fathoms deep, over gray sa[illegible] gravel, but with a twenty fathom patch at the meeting of the three passages, although [illegible] nearer the western shore.

Neill Point, as seen when off Point Defiance, is a high sloping bluff covered with tree[illegible] beach, without any bright exposed part. There is a very narrow beach at high water.

DALCO PASSAGE.

To properly designate the passage between Point Defiance and the south end of Vashon [illegible] embracing Neill and Dalco Points, we have named it the Dalco Passage. It opens into Th[illegible] rows to the southwest, into Colvos Passage to the northwest, into Commencement Bay a[illegible]

* Named by the U. S. Exploring Expedition, 1841.
† Named by the U. S. Coast Survey in 1857.

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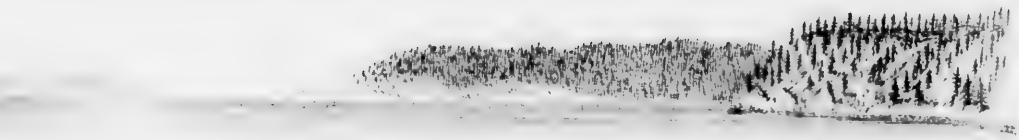
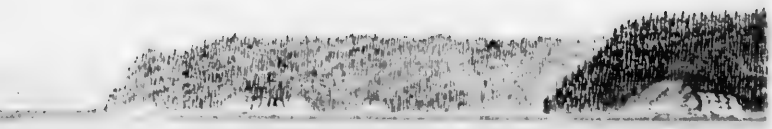
Point Defiance, SW. ¼ S., 6 miles. Neill Point, 4 mile
Entrance to the Narrows



Lee Island. Point Fosdick.

Entrance to the Narrows from the Northeast



Quartermaster Harbor

east-southeast, and into the broad waters of the inlet under Maury Island. The passage is about one and one-third miles wide and one and a half miles long. The depth of the water under each shore is quite large, reaching fifty fathoms on the south shore and sixty fathoms under the north shore, with a middle ground of thirty to forty fathoms. The currents are very variable in this passage.

THE NARROWS.

There is a relatively narrow passage leading from the more expansive channels of the Admiralty Inlet proper to the narrower but greatly ramified inlets of Puget Sound. Through it pass all the waters of Puget Sound. This passage is called The Narrows. The north entrance lies at the south entrance to the Colvos Passage, and is a direct continuation of the same; and at the western end of the Dalco Passage from Commencement Bay. The northeast point of the entrance to the Narrows is Point Defiance. Here the Narrows is one mile wide; for two miles the course is southeast one-third east, curving gradually with a slightly decreased width to south half west for three miles, when the waters of the sound open to the south and to the west. The average width of the Narrows is about three-fourths of a mile; the shores are high, bold, and in some places rocky. The summit of the cliffs is wooded. The depth of water through the mid-channel ranges from thirty to forty fathoms, with deep water close under the shores. The eastern shore is the bolder, having twenty fathoms of water within two hundred yards of the cliffs; the three-fathom line is close under the shore. Midway through The Narrows the high, long, rounding point on the west side is Point Evans, and close under it we found a sunken rock with kelp around it and in other patches along the shore. This danger is called *Evans Rock*, and lies about one hundred and thirty yards off the shore, and is just a little north of Point Evans. It has about four and a half feet of water upon it at extreme low tides, and the pilots of the steam-boats have special marks and ranges for its location when passing close to it. It is locally know as the "Bowlder." At the extreme low tides of the year, about June, this rock shows just above the water for a few minutes at the stand.

THE CURRENTS IN THE NARROWS.

In mid-channel the regular flood and ebb currents are always found to run from one-half to an hour after the rise or fall of the tide. There are generally considerable current rips, especially at the spring-tides, with strong swirls, which make the water very rough and dangerous for small boats, more particularly when the winds are contrary to the currents.

On the east side of The Narrows, and south of Point Defiance, a strong eddy current is found on the flood-tide from about abreast of Point Evans to Point Defiance. This eddy is much used by small steamers, but great care must be exercised when close to Point Defiance, if bound through the Dalco Passage to Tacoma, to haul out gradually to meet the strong flood at the point either bow on or quartering on the starboard bow, instead of running into it almost at right angles. The line between the flood and the eddy is well marked by the rip, and as both currents are strong, care is demanded.

On the west side of The Narrows, between Point Evans and Gig Harbor, there is a strong eddy current on the ebb-tide. This eddy is always taken advantage of by steam-boats and small craft, but the pilots of boats using this eddy must be careful to keep clear of "the Bowlder," or Evans Rock, already described. It is not dangerous to large craft, because they would not approach so near to the shore. On the west side of The Narrows, between Point Evans and Point Fosdick, there is slack water very close under the shore during the flood, but only the smallest craft can take advantage of it. In densely smoky weather the steam boats use the echo of the steam-whistle to learn their distance from shore, and when they make Point Defiance.

POINT DEFIANCE.

This head is the northeast point of the northern entrance to The Narrows. It is the westernmost point of the southern shore of Commencement Bay, and lies between The Narrows and that bay as a projection two miles long, pointing northwest by west (NW by W.), and decreasing in width in three-fourths of a mile to one-quarter of a mile at the extremity. It rises by several steps. Between high and low water mark there is a narrow ledge or shelf of rock bare at low water. The face of this rock is almost perpendicular, with five fathoms of water alongside, and at 70 yards off ten fathoms over rocky bottom. Above this rocky ledge there is a rise of 40 feet, a slope reaching 60 feet higher, and a third rise of 100 feet, above which the head is densely wooded and

the ground rises gradually inland. The face of the cliff is too steep for trees, and is a bright yellow color. The north face of the point looks directly into Colvos Passage. On the east side of the point the trees come down to the beach, which is very narrow, and covered at high water. There is very bold water close under the point, and the currents and strong eddies exist around the point on the flood.

Gig Harbor.—On the western side of The Narrows, at the north entrance and directly opposite Point Defiance, there is a small boat harbor with a depth of ten feet of water in the entrance and five fathoms inside. The entrance is very narrow, and is one and one fifth miles west [illegible] north (W. by N.) from Point Defiance.

The southeast point of The Narrows is Day Island, and the southwest point is Fosdick Point, nearly abreast of Day Island. They are one mile apart, nearly east and west.

Day Island Anchorage.—At the south entrance to The Narrows, on the eastern side, there is a small, narrow, projecting point from the eastern shore, which forms a little cove or indentation on the north side. The main shore itself is low and recedes slightly, thus adding to the size of the little cove. Anchorage is had in fifteen fathoms of water, but there are strong swirling currents which make it an uncomfortable berth. On the south side of this little peninsula, and outside the kelp, anchorage may also be had, but the currents are strong. There is a small patch of kelp, with bowlders, close off Day Island.

PUGET SOUND.

This name is applied in its original meaning for the sake of subdividing these waters. Up to The Narrows the channel had been broad, open, and nearly straight; south of The Narrows the shore-line of the sound and of the islands in it amounts to two hundred and eighty miles, with deep water along almost every mile. The main body of the inlet lies to the south and westward of The Narrows, and the different arms or inlets stretch through twenty-two miles of latitude and twenty-one miles of longitude, with one branch reaching within two miles of the headwaters of Hood's Canal. The general width of the main channels is one mile, and the depth of water is sufficient for the largest vessels throughout and reaches one hundred fathoms. The dangers in all these channels are few, and only two are in the main channels and require marking.

The navigation is very simple in good weather, but in thick and foggy weather it requires a full local knowledge of the currents and the peculiarities of the echoes from all the points passed by the steam-boats. With a knowledge of the tide and currents the captains and pilots run in foggy or thick smoky weather by courses and time-distances, and when approaching any point they ascertain its distance and bearing by the echo of their steam-whistle signal from the shores. In our last trip from Olympia to Steilacoom and northward in a very thick fog the steam-boat was run at full speed on given courses and the time-distances for an estimated condition of the currents; the echos from the cliffs always revealed their proximity and direction. No minute sailing directions could be drawn up to take the place of the local knowledge and experience of the pilots, and general directions are only suggestive in good weather, for the chart is the best guide.

There is an immense lumber business carried on in the sound, and this, with agriculture and stock raising, have built up many towns along the shores and in the adjacent country. The land is wooded to the edge of the cliffs, except where cleared for agriculture. On the shores of the sound are the towns of Steilacoom, Olympia, Tumwater, Arcadia, Oakland, and others.

From the head of the sound at Olympia there is direct railroad communication with the Columbia River, only fifty miles south, and the headwaters of Gray's Harbor reach within a few [illegible]

This extensive inlet was named Puget's Sound by Vancouver in June, 1792, in compliment to Lieutenant Puget who explored it. At the present time the name includes also the whole of Admiralty Inlet.

STEILACOOM.

On the eastern shore of Puget Sound, nine miles south from Point Defiance, is the town of Steilacoom, situated upon a rising bluff. The ground rises to one hundred and fifty feet, and is patched with trees; behind the crest, on the level land, is the Oregon pine. There is a wharf at the steam-boat landing, and in approaching in thick weather the echo of the vessel's steam-whistle is very good.

Vessels approaching this from the northward keep along under the eastern shore; when abreast of the south entrance to The Narrows a broad passage opens to the west, with the south end of Fox Island forming the south shore of the passage, and the west shore of the main [illegible]

into the sound. This main channel is here about seven-eighths of a mile wide. The shores of the main land and of the island are bold, high, and of nearly uniform elevation, and covered with trees. One mile south of Fox Island and one mile off the east shore there is a fourteen-foot shoal marked by a buoy; between it and the main shore there is fifty fathoms of water. A vessel keeps the eastern shore close aboard, and if bound for Steilacoom anchors off the town in fifteen fathoms of water over hard bottom about four hundred yards off the shore. The current rip in the channel abreast of the town is frequently sufficient, with a little wind, to swamp a small boat.

Off this town from Gordon Point to abreast Toliva Shoal there is a space of one-fifth to two-fifths of a mile between the twenty fathom and the inner three-fathom curve, with bottom of sand and sand and shells. Off the mouth of Steilacoom River the three-fathom curve extends out four hundred yards.

Tides at Steilacoom.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XVII^{h} 11^{m}. The mean rise and fall of tides is nine and two-tenths feet, of spring-tides, ten and nine-tenths feet, and of neap tides, seven and five-tenths feet. The mean duration of the flood is 6^{h} 7^{m}, of the ebb, 6^{h} 18^{m}, and of the stand, 28^{m}. The difference between the rise of the highest tide and the fall of the lowest tide observed was eighteen and three-tenths feet. The greatest difference observed between the height of the two low waters of one day was twelve and two-tenths feet, and the greatest difference between the higher high and the lower low waters of a day was seven and seven-tenths. The tides of the same day are generally unequal in proportion to the moon's declination.

The time and height of every tide throughout the year can be obtained by consulting the Tide Tables of the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

The extreme range of tides observed here during the survey was eighteen feet and one-tenth.

The Steilacoom River is a small stream emptying into the sound one mile north of the town, but it is now locally known as Chambers Creek. On the Admiralty chart of 1846 it is called the Chudley River, and the anchorage in the front of it Heath Bay.

Fort Steilacoom is an old military post which was located on a small gravelly prairie about one mile northeast by east from the town, with a road leading to the town and another to the river. It has been abandoned as a military post, and is now used as the Asylum for the Insane.

There is regular steam boat connection with all the Sound ports, and also telegraphic communication.

The country around Steilacoom and Nisqually is only moderately adapted to agriculture, except along the valleys of the small streams. The forest woods are oak and spruce. The mean annual rainfall at Fort Steilacoom, latitude 47° 07′, and three hundred feet above the waters of the sound, was fifty five and five tenths inches from 1849 to 1855. In winter the rainfall was twenty-four and six tenths inches, in spring eleven and two tenths, in summer three and eight tenths, and in autumn fifteen and eight tenths. The mean temperature of the year from four years' observations was 50°.7 Fahrenheit; in winter it was 39°.0, in spring 49°.0, in summer 63°.3, and in autumn 52°.2.

The pronunciation of the name Steilacoom as given to us by the Indians is Tchil′-æ-cum. On the Admiralty chart for 1847 it is called Chelakoom.

FOX ISLAND.*

The southeast end of the island lies a mile and a half south of The Narrows and reaches within seven-eighths of a mile the main shore on the east. It is four and one-third miles long northwest by west and southeast by east, with an average width of one mile. The passage between it and the main land to the north is over a mile wide at the eastern entrance abreast of Day Island, and half a mile wide at the western part, where it is known as *Hale's Passage*. There is deep water and no known dangers through the whole of this passage. The northeasternmost point of the island is a bright yellow cliff, estimated to be seventy feet high, and covered with Oregon pine to the edge.

Hale's Passage was named by the United States Exploring Expedition in 1841, but the same name was given to the passage on the east side of Lummi Island in Washington Sound. The channel between Fox Island and McNeil Island, leading northwest to Carr Inlet, is called Bruce Channel on the Admiralty chart in 1846.

* Rosario Island, Admiralty chart, No. 1947, of 1846.

Whollochet Bay.—This is a moderately wide bay opening into the north side of Hall's Passage, opposite the middle of the north shore of Fox Island, and one mile west of Point Fosdick, at the south entrance to The Narrows. The immediate shores of this bay are low, rising to wooded high land. It carries deep water for one and a half miles, when eight fathoms is found; the three-fathom curve is never more than two hundred yards from the shores. For three-fourths of a mile the bay runs to the northward and then curves gradually to the northwest by west (NW. by W.), and therefore it affords a good sheltered anchorage.

TOLIVA SHOAL.

This danger lies directly in the line of the southern entrance to The Narrows. It is one mile from Gibson Point at the southeast part of Fox Island, one mile from the eastern main shore, and one and a half miles from Steilacoom.

Vessels bound up the sound to Steilacoom, or direct to or from Olympia by Balch's Passage, must beware of this shoal. The extent within the three-fathom curve is about one hundred and fifty yards, and there are two spots on it, sixty yards apart in line to the point of Fox Island, that have fourteen feet of water upon them. One of these shoal patches is sixty yards in extent inside the three-fathom limit. The bottom on the shoal and around it is foul and is marked by a patch of kelp. Outside of it the water is very deep, the twenty-fathom curve coming close up to and around it. From the west side of the shoal this twenty-fathom curve reaches nearly to Point Gibson on Fox Island. The current rip upon the shoal is very great, and with a little wind it raises a confused, short swell sufficient to swamp a small boat.

This danger is now marked by a *second-class nun-buoy, painted with horizontal red and white stripes.* It is placed in twenty-seven feet of water in the center of the shoal, and may be passed on either hand by giving it a good berth. It is located by the following bearings and distances:

Northeast side Fox Island	N. ¼ E.	1¼ miles.
North side McNeil Island	W. ¼ N.	3⅜ miles.
East side Ketron Island, near Steilacoom	S. ¼ E.	3 miles.

This danger was named the Scarboro Shoal on the Admiralty chart, No. 1947, in 1846. It was formerly called Scarborough Shoal.

McNEIL ISLAND.

This large island lies west-northwest from Steilacoom, distant two and five-eighths miles, with depths reaching one hundred fathoms in the broad channel between them, and with deep water and no known dangers under the shores. The island is about three miles in its longer diameter, west-southwest and east northeast, and two and a quarter miles north and south. Between the north side and the south side of Fox Island there is a channel one and a half miles wide, trending northwest by west (NW. by W.) for some miles into Carr Inlet. Between the south side of the island and the north side of Anderson Island there is a comparatively narrow channel, known as Balch's Passage. McNeil Island is high and wooded, with high, bluff shores, broken at the west end; and on the southeast side towards Steilacoom there is located the Territorial penitentiary.

This island is called Duntze Island on the Admiralty chart of 1846, and the eastern extremity is named Dyke Point, and on the present charts Hyde Point.

ANDERSON ISLAND.

This is another large island lying in the sound west-southwest from Steilacoom. The east side lies opposite McNeil Island, with Balch's Passage between them. It is moderately high and wooded, with deep water around the shores, and no known dangers. It is a little over three miles from Steilacoom, and is four miles long, north northwest and south southeast, and about two and a half miles broad. The southern end reaches well down into the broad southern part of the sound opposite the mouth of the Nisqually River, only three-fourths of a mile from the Nisqually Flats. There are good passages all around the island, with the broadest towards Nisqually, forming the Nisqually Reach, and the narrowest towards McNeil Island, this latter forming Balch's Passage.

In rounding Turku Point, the south point of Anderson Island, give it a good berth, because foul bottom exists here.

In the southeast side of Anderson Island there is a deep indentation of three-fourths of a

and nearly one mile wide between the points of entrance. The line of soundings across the entrance is twenty-five fathoms, with good water close to either point, but deeper under the south point. The five-fathom line reaches nearly half a mile into the bay, with muddy bottom.

The points of entrance lie north by east and south by west from each other.

On the Coast Survey chart it is called Oro Bay. On the Admiralty chart, 1846, it is called Redd Bay. The total eclipse of the sun was observed on the south shore of this bay by the English Expedition, July 18, 1860.

This island is called Fisgard Island on the same Admiralty chart, and Balch's Passage is named the Ryder Channel.

KETRON ISLAND.

This is a narrow island one and one-fourth miles long, lying parallel with the main shore, a mile south of Steilacoom, with a half mile wide passage on the east side, called the Cormorant Pass, carrying twenty-five fathoms of water over muddy bottom, and the sound on the west side, one and a half miles wide, towards Anderson Island. This main passage has seventy-five fathoms of water over fine gray sand and mud. The island is from sixty to one hundred feet high, with steep sides, and is covered with tall Oregon pine.

Off the south end of the island the three-fathom curve reaches out one hundred and fifty yards; off the north end of the island there is kelp for one-fourth of a mile, but the three-fathom curve is only two hundred yards from the point. There is a narrow beach around the island at low water.

On the older Admiralty chart of 1846 this island was called Kittson Island, and on the earlier Coast Survey chart Kitson.

NISQUALLY.

This place is five miles south of Steilacoom, on the same side of the sound. It is at the mouth of a small stream, and at the eastern edge of the extensive Inskip Bank, or Nisqually Flats. It was one of the early posts of the Hudson Bay Company, but is now a place of little importance or trade. The old Nisqually fort was on the Nisqually plains, on the stream about one and three-eighths miles nearly east from the mouth.

Nisqually Landing.—It is one mile north of the mouth of the Nisqually River, where the Signalilchew Creek empties. There is one small saw-mill on the creek. This creek is the natural outlet of the chain of lakes on the prairies; one of these lakes (American lake) is several miles long.

THE INSKIP BANK, OR NISQUALLY FLATS.

These extensive flats lie in the broad southern bend of the sound south of Anderson Island. They are three and a half miles in extent west-southwest and east-northeast, and about three-fourths of a mile wide. They lie off the broad, low, marshy valley, through which the Nisqually River and its ramifications reach the sound. There is very deep water along the northern edge of the flats, but especially towards the eastern limit. The edge of the bank is so steep that when the United States steamer *Pensacola* was ashore there her bow was in nine feet of water and her stern in ten fathoms.

At the western limit the twenty-fathom line is at least half a mile off shore, with good water well in to the shore. The bank runs dry at low water, and at all times great numbers of snags and trunks of trees are seen upon it. It was named Inskip on the Admiralty chart in 1846.

Between the Nisqually Flats and the south end of Anderson Island the passage is known as the *Nisqually Reach*. It is one mile wide, with a depth of forty two fathoms one-fourth of a mile off the edge of the bank, where ten fathoms is found. The south end of Anderson Island, opposite the bank, is called Turku Point, or Lyle Point; a long, rounding, moderately low point with trees coming down to the high-water mark. There is a depth of ten fathoms of water for two hundred and fifty yards to the south-southeast of the point; and under the west side there is a slight indentation, called *Thompson Cove*,* with anchorage in five and six fathoms of water. Off Turku Point there are strong current rips on the flood.

* English Admiralty chart of 1846.

OLYMPIA.

It would be almost useless to attempt to describe the route between Olympia and Steilacoom, because a pilot or a chart is absolutely necessary in making the passage. The mid-channel course from wharf to wharf is twenty-one miles in length, and the width of the passage from half a mile to a mile and a half. In fine, clear weather a stranger would see nothing but land close around him as if he were in an irregularly shaped lake with arms leading in every direction. In foggy weather, or in the dense smoky weather in a dry summer, it is impossible to see a ship's length ahead, with irregular currents to add to the difficulties. The chart is then almost useless, and a thorough local knowledge of every mark on the beaches, and of the peculiarities of the echo of the steam whistle from every cliff and point, are necessary to enable the pilot to make his trips. Steam boats and tows do not take the broader channel from Steilacoom between Ketron and Anderson Islands through the Nisqually Reach, but the first course is west three-quarters south through *Balch's Passage*,* between McNeil Island on the north and Anderson Island on the south. The entrance to this passage is nearly three miles from Steilacoom, and the passage itself two miles long and half a mile wide for the middle part of the pass. There is plenty of water in this passage, and the shores are steep-to. Midway in the pass is a small rocky islet, known as *Eagle Island*; it is covered the south shore, but there is good water on either side of it. The islet is only two hundred and eighty yards long, north and south, and one hundred yards wide. It is about ten feet above high water, and covered with Oregon pine seventy feet high. The three-fathom curve is one hundred yards off the eastern side, where kelp is found out to four and five fathoms. The Eagle Island shoal within the three fathom line extends one fifth of a mile to the north west parallel to the shore of the passage. It is marked by plenty of kelp. A depth of five to six fathoms can be carried through the Southern Channel between Eagle Island and Anderson Island, keeping rather closer to the latter, and this channel is preferred by the larger steam-boats, because at night and in thick weather they can keep the courses and distances which they run in clear weather much better. Ten fathoms can be carried through the northern and wider channel between Eagle Island and McNeil Island by keeping rather close to the shore under the latter.

The Anderson Island shore abreast Eagle Island retreats a little to the southward and forms a small cove, where there is a cleared space of about ten acres, with some unpainted small houses, and under the low grassy bluff there is a short wood wharf. It is said to be a good place for steam-boats to wood up.

The southern point on McNeil Island, about the middle and on the north side of Balch's Passage, is cleared; the grassy bluff rises behind the shore to one hundred feet, to the edge of the trees. There is a large unpainted house in the clearing, and just west of this point is a large erratic bowlder close under the shore.

In making Balch's Passage from the eastward in clear weather a large building with a white fence is seen on the southeast face of McNeil Island, under the Eastern Point and about one half mile northeast of the narrow part of the passage.

There is high land on either side of a low, shallow lagoon and swampy land, and on the north side of this lagoon is the above building, which is the *Penitentiary* of the Territory.

The cliff to the southwest of this low lagoon is moderately low and bright, and for a short distance to the eastward there is a higher rising bright cliff for two hundred or three hundred feet, when it becomes faced with trees. The highest part of the island is apparently at the northeast part of this bluff, and it is estimated to be one hundred and fifty feet above the water, and covered with trees over seventy five feet high, standing apart.

Balch's Passage Light.—A fixed white light, lens lantern, has been suspended from an arm on a white post. The light is about twenty-five feet above the sea level. The post is twelve feet high, and located on the south side of the island.

The light was established on the north side of the island December, 1887, and moved to the south side of the island March 1, 1889.

After passing through Balch's Passage there is a narrow chanel, called Pitt Passage, one fifth of a mile wide, on the west side of McNeil Island, to the northward; a bay, named Titust Bay, a mile deep, with an entrance nearly half a mile wide, with good water, directly ahead; and to the south opens the broad *Drayton Passage*, one and one-half miles wide, decreasing to one mile wide in a mile and a half, and then opening into the broader waters of the sound.

* On the Admiralty chart of 1846 called Ryder Channel

This passage is three miles long, and at the southern entrance there is *Point Treble*, on the east on Anderson Island, and Park Point, or the *Devil's Head*, on the west. There is a depth of eighteen to thirty fathoms of water in it, with good water up to either shore. The direction of the channel is north and south.

THE DEVIL'S HEAD.*

This is a bluff about eighty feet above the water, and covered with trees that reach a height of one hundred feet. There are trees under the bluff down to the very narrow sand beach. It is the southern point of the unnamed peninsula between Carr's Inlet on the east and Case's Inlet on the west. Abreast of it the channel is one and one-quarter miles wide, with bold water under either shore, and reaching fifty fathoms close under the head. The three-fathom curve is within two hundred yards of the shore, except at a small point about one mile northeast from the head, where the three-fathom curve is one-quarter mile out and at the edge of the low-water line. This part of the sound is the entrance to Case's Inlet, which stretches northwest seven miles from Devil's Head, and then nearly north-northwest for eight miles farther, with an average width of one and one-quarter miles, and depths ranging from thirty-five fathoms to five at the head. To the southeast by east from the Devil's Head this broad arm reaches to the Nisqually Narrows.

As the Devil's Head is approached from the west, Mount Rainier is opened just clear of it, showing three nearly equally high summits.

From the Devil's Head the course thence towards Olympia crosses the broad channel diagonally to Moody Point, which lies west one-half south a trifle over two miles from the Devil's Head. The channel has a depth of fifty to twenty fathoms of water over mud and gray sand, with deep water close inshore, the three-fathom curve being within two hundred yards of the shore.

MOODY POINT.

This is the extremity of the promontory between the broad waters towards Drayton Passage and Nisqually Reach, and the narrow arm of the sound on the west, called Henderson's Inlet. It points directly towards the middle of Case's Inlet. It is a low sandy point of almost one hundred or two hundred yards extent, with some unpainted shanties under the trees and bluff, which are inside and behind the low shore. There is good water off the point, the twenty-fathom curve being less than a quarter of a mile out. Across Case's Inlet to the northeast the breadth of the channel is one and a half miles. Across *Dana's Passage* to the west the width is the same, with the Itsami shoal in the middle. Moody's Point is locally known as *Johnson's Point*.

Moody Point (or *Johnson's Point*) *New Light.*—A lens lantern, showing a *fixed white light*, has been suspended from a white post eighteen feet high and about twenty-three feet above the level of the water. It is about ten yards from the high-water limit of the northernmost extremity of Moody Point, and is seen from Dana's Passage, Case's Inlet, and Drayton Passage. From this Light Point Park is distant two miles north 85° east (N. 85° E.), and Point Treble, the southwestern point of Anderson Island, is distant three and three-eighths miles south 87° east (S. 87° E.).

THE ITSAMI SHOAL.

This danger lies one mile from the northernmost extremity of Moody or Johnson's Point, and half a mile from the nearest shore of Hartstene Island to the west.

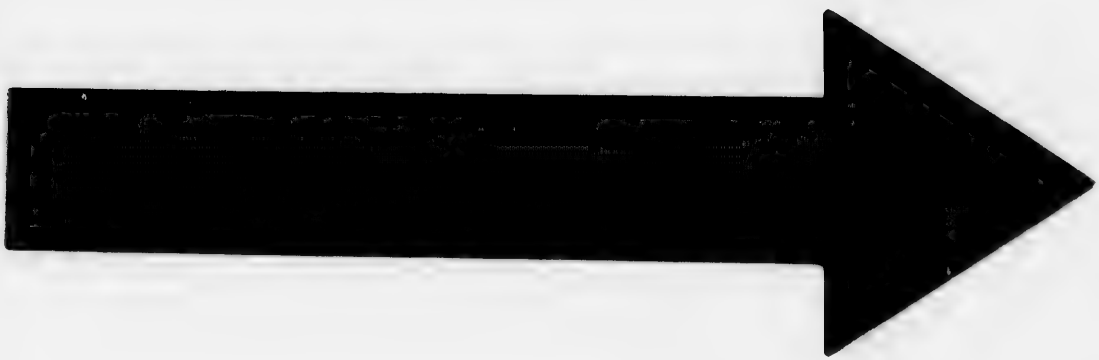
Between it and Hartstene Island the main channel runs with twenty-two fathoms of water, and good water close under the western shore.

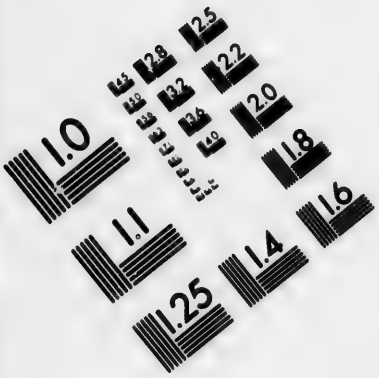
It is a rocky patch, having as little as nine feet of water upon it, with kelp spreading out to three and one-half fathoms of water. There is ten fathoms of water between the shoal and the west shore of Moody Point, and six and one-quarter fathoms between it and Dickerson's double point, half a mile to the south.

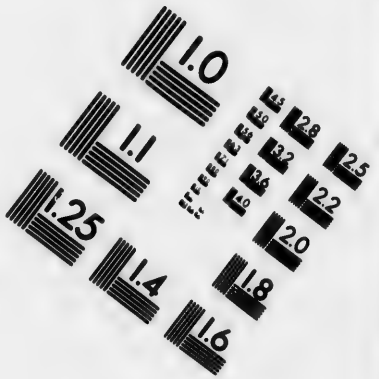
This danger is marked by a *second-class nun-buoy painted with red and black horizontal stripes*, which is placed in twenty-four feet of water over rocky bottom on the north side of the kelp patch. Vessels bound to Olympia should leave it on the port hand.

This buoy is located as follows: From it Moody Point bears northeast by east three-fourths east (NE. by E. ¾ E.), distant one mile; Point Wilson, the eastern tangent of Hartstene Island, north-

* Called Moore Bluff on Admiralty chart of 1846.







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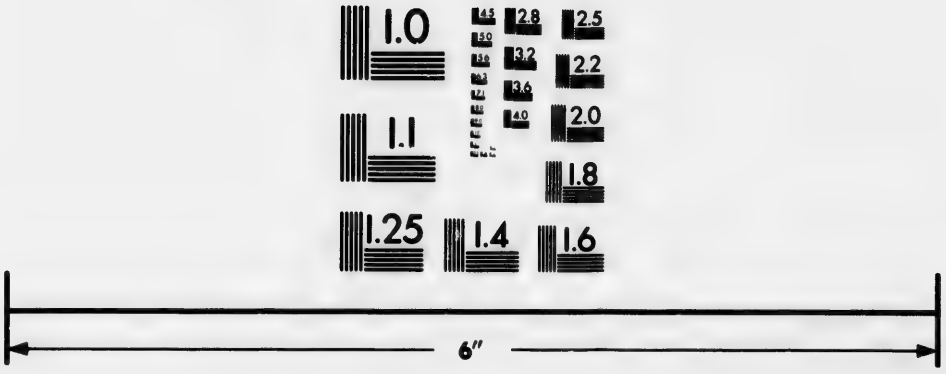

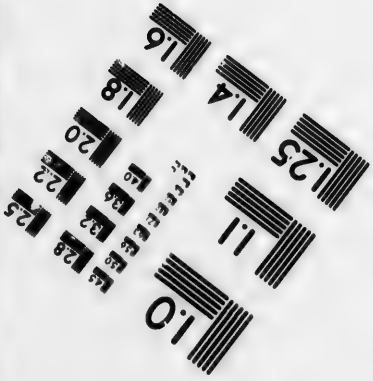

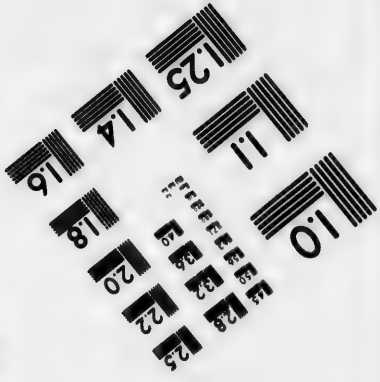

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northwest (NNW.), distant two miles. Dickerson's Point, western side southwest by south three-quarters south (SW. by S. ¾ S.), distant one and one-quarter miles.

When passing through these waters lately in the steam-boat from Olympia with [illegible] densely foggy, she kept close under the western shore in approaching Itsami buoy, and [illegible] steering northeast one-half east, and then made a straight course for Moody or Johnson Point, which was caught by the echo of the steam-whistle.

From the Itsami shoal the passage is contracted to about one-half mile wide, with [illegible] depths of twenty to fifteen fathoms of water over coarse, gray sand, shells, and gravel, and good water close to the shores.

This is *Dana's Passage*, and its general direction is southwest by south and northeast [illegible] for two miles. The eastern shore is indented and moderately low, but covered with [illegible] the western shore is formed by the south side of Hartstene Island, and is higher than the [illegible] shore.

There are *very strong* currents during spring-tides in this passage. There is foul bottom across to Brisco Point, and the edge of the channel is steep-to.

BRISCO POINT.

This is a sharp, narrow point sixty feet high on the westward side of Dana's Passage, and nearly two miles southwest from Itsami Shoal. It is wooded and has good water close to it on the east side, but the three-fathom line extends three hundred yards south from the point, with a [illegible] of kelp in four fathoms of water, and with a narrow low neck on the north.

The channel immediately on the west side of the Point is Peale's Passage, half a mile wide, and with twelve to thirteen fathoms in it; it leads to the northwest completely around Hartstene Island.

The course through Dana's Passage from Itsami Buoy and past Brisco Point is south three-quarters four degrees west (S. 34° W.) for three and three quarters miles, keeping in good water, but shoaling nearer the southeast side until the mouth of Budd's Inlet is reached between Dofflemyer's Point to the east and Point Cooper on the west, with nineteen fathoms over mud bottom in mid-channel. In entering Budd Inlet vessels keep past the mid-channel and haul up under the western shore, following it for four miles in fifteen to four fathoms of water over mud to the red buoy off the Olympia mud flats.

Dofflemyer's Point is low and cleared on the northwest, with cliffs eighty feet high to the south southeast. The three-fathom curve is close to it, but lies three hundred yards outside of Sloop's Point, one third of a mile to the northeast. For tides at Dofflemyer's Point consult the Tide Table for the Pacific Coast, published annually by the U. S. Coast and Geodetic Survey.

Dofflemyer Point Light.—A *fixed white light*, lens lantern, has been suspended from the end on a white post. The light is about twenty feet above the sea level.

The post is twelve feet high, and is situated on the northwest angle of the wharf at the Point. It is five and a half miles north-northwest from the Stake-light at Olympia.

It was established December, 1887.

Point Cooper at the western side of the entrance to Budd's Inlet projects to the northward, is low and sharp, and rises to eighty feet in half a mile towards the south-southeast. It divides Budd's Inlet from Eld Inlet, and the three-fathom curve spreads out three hundred yards from the point and narrows the entrance to Eld Inlet.

BUDD'S INLET.

This long arm at the head of the sound is three-fourths of a mile wide at the entrance, one mile wide inside, and then gradually narrows to three-fourths of a mile at the head. It is [illegible] miles long and its general direction is south southeast. For one and one-half miles before reaching Olympia the bay or inlet is occupied by an enormous mud flat, of which one-fourth is bare at low water, and this shoal within the three fathom line extends from the head of the bay for [illegible] one-half miles to the northward, and then continues under the east shore for two miles to *Wepusec Inlet*. The bluffs on the west shore average about sixty feet high, are steep, and generally covered with Oregon pine. The bluffs on the east shore are higher for the first mile and then decrease towards the head.

The average depth of water is six fathoms, and is quite uniform over a bottom of mud.

There is only *one danger* inside the inlet, and that is three and one-fourth miles south of Cooper

Point under the western shore. It is a stony patch, in part bare at low water and surrounded by hard bottom in one to three fathoms of water. The total area of this shoal spot is four hundred yards north and south and three hundred east and west, and it lies a little over a quarter of a mile off the western shore abreast the sixty-feet bluff three-fourths of a mile north of Butler's Cove. There is a good channel carrying eight and nine fathoms on the west side of it, and a broader channel on the east carrying eight to four fathoms of water. This shoal is marked by a buoy.

Large vessels pass this shoal and anchor nearly a mile to the southeast by south from it in three and one-half fathoms of water. Many vessels go to the wharf at Olympia at high water and lie there in the soft mud at low water. Steam-boats run up to the wharves at high water, but if intending to move during the time of low water they must lie nearly a mile to the northwest under the west shore, where there is a wharf, and whence there is a good road along the shore to Olympia.

OLYMPIA BUOY.

The stony patch already described lying under the western shore of Budd's Inlet, three and one-fourth miles south-southeast from Cooper Point, and two and five-eighths miles northwest by north from the Olympia wharf, is marked by a buoy on the southern side. This is a *third-class nun-buoy painted red and numbered* 2. It is placed in twenty-four feet of water over muddy bottom and lies five hundred and seventy yards south southeast from the middle of the stony patch, visible at low water, with four to three fathoms of water half way to the patch.

There is good water on either side of the buoy, but less than half way from it, towards the eastern shore, the three-fathom line is reached. A depth of three fathoms can be carried one mile farther up the inlet than the buoy by keeping close under the western shore.

The buoy is three-eighths of a mile from the nearest cliff on the west shore, where it is sixty feet above the water and rises gradually inland.

It is located by the following bearings and distances:

Doffiemyer's Point	N. 13° W.	3¾ miles.
Priest Point, east side of inlet	S. 63° E.	1¼ miles.
The Wharf at Olympia	S. 40° E.	2¼ miles.

There is a fine chart of Budd's Inlet and approaches published by the U. S. Coast and Geodetic Survey.

The Tides at Olympia.—The Corrected Establishment, or mean interval between the time of the moon's meridian transit and the time of the high water XVII^h 20^m, and the mean rise and fall of tides is ten and eight-tenths feet. The average highest tides in the month when the declination of the moon is zero and going north is seventeen and seven-tenths feet above the plane of reference; and the smallest high tide is thirteen and two-tenths feet above same plane, when the moon's declination is half its northern range and decreasing.

The lowest low water is one-half of a foot above the same plane when the moon's declination is half its northern range and increasing, and the highest low-water is eleven feet above the same plane when the moon's declination is greatest south. The largest difference of high and low waters is reported at twenty-four feet, but it has doubtless been greater than this.

The chart gives the general rule for finding the times and heights of the tides, but these can be obtained from the Pacific Tide Tables, published annually by the Coast and Geodetic Survey.

The geographical position of the flag-staff at the Capitol has been determined by the U. S. Coast and Geodetic Survey, as follows:

Latitude	47° 02′ 09″ north.
Longitude	122° 54′ 09″ west.
Or, in time	8^h 11^m 36^s.6.

The magnetic variation in January, 1882, was 21° 40′ east, with a slight increase at that time, as the easterly maximum had been very nearly reached.

Olympia is a beautiful town of about three thousand inhabitants. It is the county seat and also the Territorial capital.

The United States land offices and the office of the United States collector of internal revenue are located here. It has large private educational institutions, manufacturing establishments, three saw-mills, etc. The lumber output of the country is about twelve millions feet annually. Extensive deposits of coal have been discovered and located.

Olympia Light.—At a turn in the channel near the steam-boat wharves at Olympia, a [illegible] *light*, lens lantern, has been suspended from an arm on a pile. The light is about two [illegible] feet above the sea level. The pile is about seventeen yards west of the west edge of the channel, and is about one-fifth of a mile west by north half north (W. by N. ½ N.) from the inner end of the long wharf. It is about one and a quarter miles south by east half east (S. by E. ½ E.) from Priest Point. The light should be left to the westward and passed close to.

It was established October 1, 1888.

West Olympia New Light.—A lens lantern showing a *fixed red light* has been suspended from the arm on a pile in a small wharf at West Olympia. The pile is about ten feet west of the high water shore-line, and the channel is close to the shore. The light is about twenty feet above the level of the water, and from it the following bearings and distances are given: Priest Point [illegible] north one and one-eighth miles; end of long wharf from Olympia, north by east half east (N. by E. ½ E.), and the Olympia Light east by south half south (E. by S. ½ S.).

It was first shown March 1, 1889.

Olympia has regular connection with all the sound ports by steam-boats; also with Seattle, Tacoma, and the Columbia River by rail.

Olympia is near the headwaters of the Chehalis River emptying into Gray's Bay, and only forty miles in a straight line from the Columbia River. The country around Olympia is well adapted to agriculture, and many pleasant homes are seen on the shores of Budd and other inlets.

Olympia Wharf.—A new wharf has been projected northward from the town of Olympia through the middle of the great flats, five-eighths of a mile beyond the old wharf. It reaches [illegible] three or four feet of water at the lowest tides. It is reported that Brown's wharf on the west side of Budd's Inlet, and just inside the three-fathom line, at the edge of the great flat, will be disused.

*Tumwater** is a village about one mile south of Olympia on the Des Chutes River, where the water power of the falls is utilized by mills for various products of manufacture.

It would require an immense amount of detail to describe the intricacy of all the inlets, passages, and islets throughout Puget Sound south of The Narrows. The principal navigation is from Olympia by the route just described to Steilacoom and thence to Tacoma and Seattle. There are now small towns and settlements growing upon the shores of these inlets, and small saw-mills; there is no extensive shipping among them. There is good water through the narrower reaches, which have bold shores and a pine-covered country. Case's Inlet and Carro Inlet are the principal arms, each being about twelve miles long and from one to two miles wide, with [illegible] fifty fathoms in them and no dangers; the peninsula between them has several lakes through it.

There is one saw-mill on Case's Inlet.

The chart gives all that is at present needed for the navigation of these waters. Consult Coast and Geodetic Survey charts 662 and 684.

HOOD'S CANAL.†

This great arm of Admiralty Inlet commences fourteen and one-quarter miles inside the entrance to the inlet, off Point Wilson; opening on the west side of the great channel, between the Foulweather Bluff on the east of the entrance and Basalt Point on the west; the latter bearing west one fourth north two and three miles from the former.

The general course of this canal is south by east. From the entrance the first mile [illegible] course is nearly southeast for five miles, pointing directly into Port Gamble (on the east side of the canal), at the entrance to which the mill and houses are plainly visible.

At three and three-quarters miles from the entrance there is passed on the starboard hand a high, round, wooded peninsula three-quarters of a mile long north and south and half a mile east and west. It is connected with the main land by a narrow neck of low sand beach. This *peninsula is frequently mistaken for an island*, and is named Hood's Head. Between this [illegible] Port Gamble the canal changes its course and runs in nearly a straight line south by [illegible] forty miles, with an average width of one and one half miles.

In latitude 47° 21′ north the canal makes an abrupt turn and runs twelve miles nearly [illegible] east, where it heads within two miles of the head of Case's Inlet in Puget Sound.

* It was formerly called New Market. † Named by Vancouver in June, 1792.

At fifteen miles from Port Gamble there is a slight crook in the line of the canal, and at seventeen miles another broad arm stretches to the north by west for ten miles, with a peninsula one and one-half miles in width between it and the canal. This is the Toandos Peninsula.

The shore-line of the canal amounts to one hundred and ninety-two miles.

The shores of this great canal are bold, high, and wooded, rising to much greater heights than anywhere else on the inlet or sound. This is particularly so on the western shore, where the west shore of the Dabop Bay, on the west side of Toandos Peninsula, attains an elevation of two thousand six hundred feet in less than two miles from the water. These high flanking mountains of the Olympus Range are called the Jupiter Hills. The eastern peaks of Olympus Mountains come pressing close towards Hood's Canal, averaging less than eight miles from the shore, and nearly parallel thereunto. Behind the Jupiter Hills is Mount Constance, seven thousand seven hundred and seventy-seven feet elevation; The Brothers, six thousand nine hundred and twenty feet, and Mount Ellinor, estimated at six thousand five hundred feet. These great masses, rising so abruptly in wild, rocky peaks, are marks all over Admiralty Inlet and Puget Sound, but seem to overhang the main part of the canal. The Brothers, a double peak, is less than seven miles from the water.

The depth of water through the canal is everywhere great, ranging from one hundred to fifty fathoms as far as the sharp turn, and thence to within three miles of the head, carrying twenty, ten, and three fathoms. It is remarkably free from hidden dangers.

There are several of the largest lumber mills of this region in the canal.

Hood's Canal was named by Vancouver in May, 1792. Vol. I, p. 243.

PORT LUDLOW.

Two miles directly west of Foulweather Bluff is the broad opening to Port Ludlow on the west side of the entrance to Hood's Canal. This bay has a broad entrance open towards the north. The two points of the entrance are Tala Point to the southeast and Basalt Point to the northwest, the latter lying one and seven-eighths miles exactly northwest from the former. Tala Point lies one and three-quarters miles southwest one-third west (SW. ⅓ W.) from Foulweather Bluff.

*Tala Point** is a bright bluff head less than a quarter of a mile broad, covered on top with Oregon pine. *Basalt Point* is a rounding, jagged point, covered with trees to the shore-line and rising to a moderate hillock covered with wood. One-quarter of a mile north of Basalt Point, and that distance off shore, there is a patch of low rocks one hundred and seventy-five yards in extent and marked by kelp. There is deep water all around this danger, and sixteen fathoms may be carried inside it. It is called the *Klas Rock*.

From Tala Point there is a bar of hard sand nearly one-quarter of a mile wide within the five-fathom line, stretching in an outward curve to Colvos Rocks, which lie one-third the distance from Basalt Point to Tala Point.

The three fathom curve stretches nearly three-eighths of a mile, with a width of one-quarter of a mile, from Tala Point to the north-northwest, reaching to the black buoy; the bottom is hard sand. The low-water line is two hundred yards from the cape, and kelp lies for a quarter of a mile to the northward.

Abreast Tala Point the width of the bay is three-quarters of a mile, with good water and good holding ground; but it is gradually contracted in width to less than half a mile abreast the saw-mill, at which vessels load. Inside of the saw-mill point there is an excellent anchorage in seven to eight fathoms of water, over soft mud.

The approaches to this harbor are marked by two dangers. The Klas Rock north of Basalt Point has already been described.

*The Colvos Rocks** are a cluster of three rocks; the nearest one to the shore lies nearly half a mile southeast from Basalt Point. It is twenty-five feet high, and of small extent; the largest rock is a quarter of a mile farther on the same course. The third one is two hundred yards north of the outer one. There is deep water around the northwest rock, but a long shoal stretches to the southeast from the largest. The bottom around these rocks is rocky, and hard sand. From these rocks there is a bar nearly one-quarter mile wide, of less than five fathoms, reaching in an outward curve towards Tala Point.

* Named by U. S. Exploring Expedition, 1841.

There is deep water on the north, west, and east sides of the northeastern rock of the Colvos group.

There is very shoal ground for two hundred and fifty yards south from the southeast Colvos Rock, and from this there is a long tail of hard, sandy bottom stretching over three-eighths of a mile nearly west-southwest towards the red buoy.

Abreast the Colvos Rocks, and nearly one-quarter of a mile from the shore, there is a large rock. This is the *Snake Rock*, one hundred and fifty yards in extent and just awash at high tide. There is a narrow line of three fathoms of water just inside of it.

The deepest channel into this bay lies outside the Klas Rock, and between the inner Colvos Rock and the Snake Rock, where the channel is six hundred yards wide between the five-fathom lines, and carries sixteen fathoms of water over sticky bottom. Thence everything is clear to the head of the bay, gradually reducing the depth to eight and seven fathoms inside the saw-mill spit, and having good water under each shore, but the better water under the west shore. There is a broad foreshore, or low water beach, under the east shore.

The usual channel is between the Colvos Rocks and Tala Point, crossing the bar in four and a quarter fathoms of water, over hard sandy bottom, between the red and black buoys.

This passage is three-eighths of a mile wide, and the buoys lie north three-fourths west and south three fourths east from each other.

If the wind and currents do not suit for entering by this buoyed channel, a vessel may enter inside of the Colvos Rocks, carrying good water over a soft muddy bottom. The approaches to both channels are good.

The general direction of the western shore of the bay from Basalt Point is south-southeast for two and three-eighths miles, to the saw-mill.

It is in part low, broken bluff, with a gently rising country behind, covered with the Oregon pine. The low-water beach is about fifty yards wide, and the three-fathom line is from one hundred to two hundred yards from the shore, except near Snake Rock, which it nearly reaches. The general direction of the eastern side of the bay from Tala Point is south by west for one and one-quarter miles; the shore is high under Tala Point and decreases to the southward in the bay. Abreast the Saw-Mill Point the width of the bay is three-eighths of a mile, but the channel is narrowed by a shoal from the southeast shore, stretching fully one-eighth of a mile towards Saw-Mill Point. Inside the Saw-Mill Point the bay affords a beautiful anchorage in six to eight fathoms of water over soft mud for half a mile to the southward and westward. This small basin is completely landlocked, and is protected from gales from every quarter by the high land and high trees around it.

COLVOS ROCK BUOY.

This buoy has been placed half a mile east-southeast from the southeast Colvos Rock at the tail of the hard, sandy bank or bar making out in that direction. It is a *second-class nun-buoy, painted red and numbered* **2**. It is placed in twenty four feet of water, over hard, sandy bottom: from it we have the following bearings and distances to locate it:

Foulweather Bluff, black buoy	E. by N. ½ N.	2 miles.
Southeast Colvos Rock	WNW.	Nearly ½ mile.
Tala Point	SE. by S. ½ S.	½ mile.
Saw-mill at head of bay	S. by W. ½ W.	1¾ miles.
Tala Point, black buoy	S. by E.	¾ miles.

TALA POINT BUOY.

This buoy has been placed on the northwest point of the hard sand bank or bar making out three-eighths of a mile north-northwest from Tala Point. It is a *first-class spar-buoy painted red and numbered* **1**. It is placed in 15 feet of water over hard, sandy bottom and marks the southeast edge of the channel across the four-fathom bar to the entrance to Port Ludlow. From it we have the following bearings and distances to locate it:

Saw-mill in the head of the bay	S. by W. ½ W.	1¾ miles.
East tangent Tala Point	SE. ½ S.	½ mile.
Southeast Colvos Rock	NW. ½ N.	½ mile.
Colvos Rock, red buoy	N. by W. ½ mile.	
Foulweather Bluff, black buoy	NE. ½ E.	2½ miles.

The geographical position of the saw-mill at Port Ludlow, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 55′ 19″.6 north.
Longitude	122° 40′ 50.2″ west.
Or, in time	8h 10m 43s.4

In January, 1885, the magnetic variation was 22° 19′ east, with an annual decrease of 0′.5. The maximum easterly variation was passed a few years before that date.

Tides at Port Ludlow.—The Corrected Establishment, or mean interval between the time of the moon's transit and the time of high water, is XVIh 25m.

To ascertain the time and height of every tide throughout the year consult the Pacific Tide Tables, published annually by the U. S. Coast and Geodetic Survey.

Vancouver denotes this bay on his chart, but he makes no reference to it in his narrative, and applies no name to it.

Port Ludlow has always been an important lumbering place, and for some years there was a large ship-building establishment at the head of the bay. The first steam-boat built in these waters was launched here in 1860. In later years one firm, from 1873 to 1881, built thirty-one vessels, having a total tonnage of six thousand nine hundred and one tons, of which the largest was four hundred and seventy-one tons burden.

About a mile from the mill there is an ample water-power with an available head of eighty feet.

The harbor received its present name from the United States Exploring Expedition in 1841.

Mats-mats boat harbor.—On the north side of Basat Point, and between it and Olele Point, which is the southern boundary of Oak Cove, there is the narrow mouth of a small boat harbor; the entrance to it is over half a mile long, and about one hundred yards wide. It starts in on a southwest by west course for one quarter of a mile, and then makes a sudden turn to the south for one-third of a mile. At this turn the channel is obstructed by rocks, and carries only three feet of water.

Beyond that the channel deepens, and in the harbor the depth ranges to two fathoms. The extent of the harbor, which is bordered by a broad low-water beach, is about three quarters of a mile north-northwest and south-southeast, by one-third of a mile in width.

Off the mouth of this harbor lies the Klas Rock, one quarter of a mile to the east-northeast. This rock has been already described. The depth of the water between the rock and the shore is sixteen fathoms, with six fathoms close to the mouth of Mats-mats.

HOOD'S HEAD.

This is the island-like mass on the western side of Hood's Canal, three miles inside of Foulweather Bluff. It is about three-quarters of a mile long north by west and south by east, and three-eighths of a mile wide. It is joined to the western main shore by a low, narrow strip of sandy beach half a mile long, which has moderately deep water on the north side and a contracted shallow cove on the south. A vessel may anchor to the northwestward of the head in fifteen fathoms of water, over muddy bottom, at one-third of a mile from the shore.

The north face of the head is a very steep, bare cliff, nearly three-eighths of a mile frontage east and west, and the south face is a rounding, high, bare cliff.

All behind the cliffs is covered with Oregon pine. At the northeast point of the head a low, sandy point makes out three hundred yards and terminates in a very sharp point; towards the higher ground the point is marshy. This is *Point Hannon*, and off it deep water is found with strong swirling currents.

From Point Hannon the black buoy off Tala Point bears northwest by west (NW. by W.) three and one-half miles; the low point inside of Foulweather Bluff northwest by north, one third north (NW. by N. ⅓ N.) two and three-quarter miles, and the saw-mill of Port Gamble southeast four-fifths east (S. E. ⅘ E.) two and one-third miles. The width of the channel abreast this point is only one and one-fifth miles.

We examined and named Hood's Head in 1856; it was noted by Vancouver in 1792, but not named.

PORT GAMBLE.

This is the second harbor inside the entrance to Hood's Canal. It is on the east side of the Canal, and the mills, ships, and buildings are seen from mid-channel west of Foulweather Bluff, five and one-half miles to the southeast. In clear weather it is seen as a depression in the coast line.

Port Gamble is a land-locked bay two and one-third miles long north-northwest and south-southeast, with a nearly uniform width of five-eighths of a mile. It narrows at the entrance between two low, grassy sand spits only three hundred yards apart, and with a channel-way of one hundred and twenty yards width between the three-fathom lines. The deepest water in the bay is nine fathoms, and it may be said to have a nearly uniform depth of five fathoms. On the eastern point there is an Indian village. On the western point of the entrance is situated the great saw-mill; and the buildings reach to the rise of the bluff to the westward. The wharves on the western point are built out so that vessels have deep water between them and East Point.

At the saw mill the escaping steam and smoke is a good mark for the place; there is also a constant smoke going up from the burning "slab pile," even if the mill be not running. The steam and smoke are distinctly visible from part of Port Townsend, over the low isthmus between that bay and Oak Cove.

Outside of the entrance to the bay there is a hard sand flat on either side; that from the east shore reaches westward three hundred yards; that on the west stretches out north by west from the mill parallel with the east shore. Between these two flats is the channel-way, ninety yards wide between the three-fathom curves.

Westward of the entrance for one and one-eighth of a mile there is a remarkably straight shore-line, partly cliff and partly low ground, towards the west, where Salsbury Point marks the turn of the shore-line to the southward.

Vessels from the northward after leaving Marrowstone Point pass Nodule Point, six miles from Foulweather Bluff, on a southwest by south one-fourth south course (SW. by S. ¼ S.), steering for Hood's Head if it is recognized. This course passes more than a mile to the westward of Foulweather Bluff, and nearly half way between Foulweather Bluff buoy and Colvos Rock buoy.

After passing Foulweather Bluff keep closer to the eastern shore than to the western to avoid the strong and irregular current passing around the low point, which makes out two hundred and seventy-five yards eastward from Hood's Head. Then run for the saw-mill plainly in sight on the west side of the entrance, and when within a mile of it approach the eastern shore within one third of a mile. When it is foggy or smoky steam-boats get their distance from the shore by the echo of their whistles.

Outside of this entrance the bottom is sticky out to fifteen fathoms; beyond that it falls off rapidly. A vessel may anchor in eight fathoms, with the mill bearing south-southeast, distant three-quarters of a mile, and the eastern shore distant three-eighths of a mile.

When a small vessel is going in she must have either good local knowledge of the channel and natural ranges or must keep the lead going smartly.

In summer the wind generally blows into the harbor lightly; in winter the southeast gales prevail and draw directly out. When entering under sail a vessel must drop in with the early flood. Loaded vessels are towed in and out by the tug; when without the tug, they must wait for in summer with the last of the ebb or trust to a light southerly air in the morning, with a strong current. None but small smartly-working vessels can beat out, and very few of them have done so within channel limits. When a small vessel is beating out she should go out on the ebb.

Inside the saw-mill and Indian village points there is good water in the mid-channel for anchorage. On the western side there was formerly a crib in three and a half fathoms of water, around which a shoal has formed, with only ten to fifteen feet of water; between this crib and the steam-boat wharf there is from seventeen to twenty-two feet of water; if a vessel has to anchor, she can do so just beyond this crib in five fathoms of water over soft, muddy bottom.

On the east side of the steam-boat wharf, which lies nearly north and south, there is a depth of five to twenty-two feet, the shoaler water being at the north end. On the south side of the wharf, where the lumber vessels lie to receive their cargoes, there is a depth of twenty-one to twenty-four feet at twenty feet from the wharf.

Inside of the steam-boat wharf, with an opening to the northward, there is a "Gridiron," upon which small vessels are taken out at high water for repair or examination. It has twelve feet of water on it at high water.

The shores of the bay are steep, but not high, and are bordered by a sand and pebbly head, offering capital chances for heaving down a vessel.

The geographical position of the eastern part of the entrance, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 51′ 28″.2 north.
Longitude	122 34 21 .0 west.
Or, in time	8h 10m 17s.4.

In January, 1885, the magnetic variation was 22° 22′ east, with an annual decrease of about half a minute; the maximum variation had been reached a few years earlier.

The Tides at Port Gamble.—The Corrected Establishment, or mean interval between the moon's transit and the time of high water, is XVIh 28m.

To ascertain the time and height of every tide throughout the year, consult the Pacific Tide tables, published annually by the U. S. Coast and Geodetic Survey.

The saw-mill at Port Gamble is the largest and the most effective in the Territory, and has reached an output of over three millions of feet of lumber per month, and has reached three hundred and fifty thousand feet of lumber in twenty-four hours. With the Port Ludlow and Utsalády mills under the same company, the output is sixty millions feet of dressed and undressed lumber per year, besides vast quantities of laths, shingles, etc. A large amount of the lumber and rough spars is carried to Australia and the Sandwich Islands.

From this place a road has been made to the Agate Passage at the southwest part of Port Madison, and another to the Washington saw mill at Seabeck Harbor, in Hood's Canal.

The Indian name of the western point of the entrance to this bay is Tee-ka let, and the place went by that name for some time.

The bay received its present name from the United States Exploring Expedition in 1841. It is placed on Vancouver's chart, but he did not enter it or name it.

SQUAMISH HARBOR.

The point on the western shore nearly one mile south of Hood's Head is Termination Point, with high, wooded land behind it, and a low, narrow beach in front.

At Termination Point the shore continues southwest for nearly one mile, and then sweeps west-southwest for two miles, to the head of Squamish Bay. From this head of the bay the west shore runs southeast for two miles, thus forming a large triangular open bay with moderately low shores, a low valley and stream at the head, and marshy land under the shore, with a broad low-water beach. A large sand bank parallel with the west side, one mile long and nearly half a mile wide, lies within one-third of a mile of the west shore. There is a six-fathom channel inside of this shoal, and around the north end.

On the east side of this shoal, and under the north shore, and across the mouth of the bay, there is good water. In thick weather the approaches to the shoal, which is in part bare, are detected by the lead; the soundings decrease with fair regularity; from twenty fathoms the bottom is muddy.

From Termination Point the ten-fathoms curve runs nearly south for three-quarters of a mile, to the two rocks called *the Sisters*, which lie north and south of each other.

These rocks are four hundred and twenty yards broad off the south face of Termination Point, and are, therefore, near one-quarter the width of the channel from the western shore. Each is about one hundred and fifty yards in extent, and they are covered at half tide; the tide ranges from ten to twelve feet. They lie north northeast and south-southwest from each other, and are eighty yards apart. There is a depth of seven fathoms between them, and good water all around them. Their walls are bold, and they are marked by a patch of kelp around them.

The southern rock lies one and one-third miles from Salsbury Point and one-fifth of a mile from Termination Point.

These rocks are also known as the Squamish Rocks.

The north shore of the harbor is called Yulkat Bluff.

The shoal in the west part of the harbor is known as Case's Bank.

SEABECK BAY.*

Southward from Termination and Salsbury Points the canal runs for twelve miles in a south by west direction, with a general width of one and one half miles, gradually decreasing to the point of the Toandos Peninsula, on the west side of the canal. The shores are bold, and there is deep water close under them, and no known danger.

The bottom ranges from thirty fathoms in depth to seventy-two at the narrowest part, and the currents are strong.

The eastern point of the Toandos Peninsula is *Hazel Point*,† and here the canal takes a direction nearly southwest by west for five miles. Under the eastern shore of this reach, and abreast *Oak Head*, which is the southernmost extremity of Toandos Peninsula, lies the harbor of Seabeck. This bay is an indentation of about one mile in a southerly direction, and is free of rocks, open to the north by east. At its narrow head there is the mouth of a small stream. On the east side of the bay the shore is moderately low; on the west there is a long point which forms a protection to the bay. On the old charts this projection was called Seabeck Point; on the new ones it is named Point Misery. At the entrance the harbor is more than three quarters of a mile wide, with fifteen fathoms over sandy bottom in the middle; near the head it is contracted, but a depth of five fathoms of water is carried well up to the mill, which is on the eastern side.

The geographical position of Point Misery as determined by the U. S. Coast and Geodetic Survey, is:

Latitude	47° 39′ 18″.3 north
Longitude	122° 49′ 42″.8 west

There is a very large saw-mill established here, and in 1885 the monthly output was over one million feet of lumber, besides laths, shingles, etc.; vessels are towed in and out of Hood's Canal.

This bay was formerly called Hahainish Harbor,‡ but the name was changed to Seabeck by the settlers when they built the first saw-mill here. The harbor is noted on Vancouver's chart, but he did not enter it or give it any name.

HAZEL POINT.

This is the southeasternmost projection of the Toandos Peninsula, and is three and one third miles north northeast (NNE.) from Point Misery; and one and two-thirds miles north 50 degrees east (N. 50° E.) from Oak Head, which is the southernmost extremity of the peninsula. There is very deep water close off it, and the canal is here just a trifle over one mile wide. It is in—

Latitude	47° 41′ 34″.9 north.
Longitude	122° 46′ 11″.5 west

Vancouver applied the name to the extremity of the peninsula.

OAK HEAD.

This is the Nukalowap Point of the older charts: it is the southernmost projection of Toandos Peninsula. It is high and abrupt, with deep water close under the shore. It is almost two miles north from Point Misery, with sixty fathoms of water in mid-channel.

It is in latitude 47° 40′ 57″.4 north. Vancouver placed it in latitude 47° 39′ north, and called it Hazel Point, on account of the many hazel trees found there.

Fisherman's Bay.—Just on the east side of Oak Head there is a long, narrow cove making in to the northwest by west for three-quarters of a mile. There is a little spit at the west side of the entrance, and the water is not deep.

DABOP BAY.

The southern extremity of Toandos Peninsula is Oak Head, whence the shore runs west northwest for a mile, and then nearly north by west for nine miles, with a broad arm of Hood's Canal extending that far in and ending in two smaller arms. This Bay has very bold shores, deep water, and very high hills on the west side. The western arm at the north is named Quilcene

*It is called Seabeck Harbor by U. S. Exploring Expedition, 1841; also Seabeck Point.
†Named by Vancouver in 1792.
‡U. S. Exploring Expedition, 1841.

Bay, and is shallow and marshy at the head, where there is a small settlement, called Quilcene, on the left bank of Big River. The large mountain stream entering Quilcene Bay has its rise in the northeast flank of Mount Constance by two tributaries, and a third tributary comes from a large lake nearly midway to Port Discovery, and nearly reaches Crocker Lake, which empties into Port Discovery.

The geographical position of Quilcene, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude ..... 47° 46′ 47″.5 north.
Longitude ..... 122° 51′ 51″.1 west.

The mountains are two thousand six hundred feet high, within one and a half miles of the west shore. These are the Jupiter Hills, already mentioned.

Abreast of Oak Head, on the west side of Dabop Bay, the *Duckwallips River* empties, and has formed a flat delta and a broad shoal in front. This shoal is two miles long and half a mile wide, with deep water close up to it. Between this shoal and Tskulsko Point, the nearest part of the Toandos Peninsula and one mile west of Oak Head, the width of the bay is one and seven-eighths miles, and the depth of water is eighty fathoms, over muddy bottom. On either side of this river the mountains rise to one thousand five hundred and forty feet, and to two thousand three hundred feet within one and one-half miles. This stream breaks through the mountains from the east side of Mount Constance, and on a recent map of the Territory it is called the Sylopish Creek.

Hood's Canal, continued.—Southward from Point Misery at Seabeck Harbor the canal runs in nearly a straight line south two-thirds west for twenty one miles, with a nearly uniform and average width of one and a quarter miles. It has bold, rocky shores on either side, the eastern land of the Great Peninsula being of moderate height; the western land rising boldly and rapidly to seven thousand feet at the eastern peaks of the Olympus range. "The Brothers" and Mount Ellinor, with elevations over six thousand feet, lying only seven or eight miles to the westward, and Mount Constance ten and a half miles, but reaching seven thousand seven hundred and seventy-seven feet elevation. The depth of water is very deep close under the shores, except where streams make out; and through the mid-channel the depths range from more than ninety to fifty fathoms of water. The bottom of these depths is mud throughout.

Four miles southwest from Oak Head and on the west side of the canal there is a moderately low head, named *Quatsap Point*, under the south side of which is a broad open bay one mile wide with an extensive flat extending out to the line of the northeast and southwest points.

This bay receives the *Duckabus River*, which brings down much detritus.

The mountain on the south side of the river and only two miles back is two thousand three hundred and eighty feet high. This mountain is the southern part of the range of Jupiter Hills, running thence northward to the Quilcene River.

HAMAHAMA RIVER.

This stream empties on the west side of the canal twelve miles south, twenty-six degrees west (S. 26° W.) from Oak Head. It is marked by a broad flat one mile long and one-third of a mile wide in front of it, with fifteen fathoms of water close outside; but the twenty-fathom curve reaches out to mid channel to the southeastward. This river drains a large lake four or five miles behind the high mountains over the shore, and into this lake a large stream comes from the Olympus range.

The geographical position of this river, as determined by the U. S. Coast and Geodetic Survey, is:

Latitude ..... 47° 32′ 05″.4 north.
Longitude ..... 123° 02′ 29″.4 west.

On the old work in this canal the name was Humahuma.

The Great Bend of Hood's Canal is twenty-two and one-half miles by the mid-channel course from Point Misery. Here the breadth of the canal expands to two miles for the same distance, and thence runs nearly fifteen miles, to the head, in a general northeast direction, decreasing in width to half a mile at Sister's Point on the north side. The shores are bolder on the port hand going up; the depth of water continues large to within two and a half miles of the head, where there is a depth of three fathoms only. The head has mud flats, and the width decreases to half a mile.

It is within half a mile of the head of Case's Inlet in Puget Sound.

At the extreme head of the canal is the village of Clifton.

Annas Bay.—This is the southernmost part of Hood's Canal at the Great Bend, and it receives the water, of the Skokomish River, which has brought down so much detritus that a square mile of the bay is a great sand and mud flat, with deep water around the outer edge to the west and north. There is deep water between the western edge of this bank and the western mainshore, one mile distant. On the point at the south side of the shore of the inlet and forming the east side of Annas Bay is the village of Union City, which has a road through to Oakland on Hammersly's Inlet.

The Skokomish is a large mountain stream coming around the southeast flank of the Olympics mountains.

It drains a large lake, named Cushman, high up the flanks of Mount Ellinor.

The Skokomish Indian reservation embraces the mouth of the river and the west shores of Annas Bay.

The geographical position of the Coast Survey Station Annas, about one mile west of the mouth of the Skokomish River, is

Latitude	47° 20′ 48″.8 north
Longitude	123° 08′ 41″.1 west.

Vancouver placed it in latitude 47° 21′ north, according to the chart.

Ayres Point is the head which forms the farthest projection of the Great Peninsula from the northward into the canal at Annas Bay. It is a high, rounding point, and has deep water close under it.

Sister's Point is a high, rounding, bluff head on the north shore of the canal four miles east of Ayres Point at the Great Bend. It projects from the northward and nearly shuts the canal, leaving a channel only half a mile wide, with deep water over gravelly bottom. This is "Vancouver's farthest."

Clifton.—This village is at the extreme head of Hood's Canal, with a long sand and mud flat for two and one-half miles down the canal.

There is a road thence to Oakland, the county seat on Hammersly's Inlet, another to Lightville, at the head of Case's Inlet, and a third to Seabeck Harbor. It is in latitude 47° 26⅝′ north.

INFORMATION CONCERNING THE PILOT REGULATIONS OF DIFFERENT PORTS, QUARANTINE REGULATIONS, THE REGULATIONS OF IMMIGRATION, INTERNATIONAL REGULATIONS TO PREVENT COLLISIONS AT SEA, ETC.

RULES AND REGULATIONS FOR THE GOVERNMENT OF PILOTS, ADOPTED BY THE UNITED STATES BOARD OF SUPERVISING INSPECTORS JUNE, 1871, AND AMENDED JANUARY, 1875, JANUARY, 1881, AND JANUARY, 1882.

All pilots of steamers navigating seas, gulfs, lakes, bays, or rivers (except the Red River of the North and rivers emptying into the Gulf of Mexico and their tributaries), when meeting or approaching each other, whether by day or by night, and as soon as fully within sound of the steam-whistle, shall observe and comply with the following

REGULATIONS.

RULE I. When steamers are approaching each other "head and head," or nearly so, it shall be the duty of each steamer to pass to the right or port side of the other; and the pilot of either steamer may be first in determining to pursue this course, and thereupon shall give, as a signal of his intention, one short and distinct blast of his steam-whistle, which the pilot of the other steamer shall answer promptly by a similar blast of his steam-whistle, and thereupon such steamers shall pass to the right, or port side, of each other. But if the course of such steamers is so far on the starboard of each other as not to be considered by pilots as meeting "head and head," or nearly so, the pilot so first deciding shall immediately give two short and distinct blasts of his steam-whistle, which the pilot of the other steamer shall answer promptly by two similar blasts of his steam whistle, and they shall pass to the left, or on the starboard side, of each other.

NOTE.—In the night steamers will be considered meeting "head and head" so long as both the colored lights of each are in view of the other.

RULE II. When steamers are approaching each other in an oblique direction they shall pass to the right of each other, as if meeting "head and head," or nearly so, and the signals by whistle shall be given and answered promptly, as in that case specified.

RULE III. If, when steamers are approaching each other, the pilot of either vessel fails to understand the course or intention of the other, whether from signals being given or answered erroneously, or from other causes, the pilot so in doubt shall immediately signify the same by giving several short and rapid blasts of the steam-whistle; and if the vessels shall have approached within half a mile of each other, both shall be immediately slowed to a speed barely sufficient for steerage-way until the proper signals are given, answered, and understood, or until the vessels shall have passed each other.

RULE IV. When steamers are running in a fog or thick weather it shall be the duty of the pilot to cause a long blast of the steam-whistle to be sounded at intervals not exceeding one minute.

Steamers, when drifting or at anchor in the fair-way of other vessels in a fog or thick weather, shall *ring their bells* at intervals of not more than two minutes.

RULE V. Whenever a steamer is nearing a short bend or curve in the channel, where, from the height of the banks or other cause, a steamer approaching from the opposite direction can not be seen for a distance of half a mile, the pilot of such steamer, when he shall have arrived within half a mile of such curve or bend, shall give a signal by one long blast of the steam-whistle, which signal shall be answered by a similar blast given by the pilot of any approaching steamer that may be within hearing. Should such signal be so answered by a steamer upon the farther side of such bend, then the usual signals for meeting and passing shall immediately be given and

answered; but if the first alarm-signal of such pilot be not answered he is to consider the channel clear and govern himself accordingly.

RULE VI. The signals, by the blowing of the steam-whistle, shall be given and answered by pilots in compliance with these rules, not only when meeting "head and head," or nearly so, but at all times when passing or meeting at a distance within half a mile of each other, and whether passing to the starboard or port.

RULE VII. When two steamers are approaching the narrows known as "Hell Gate," on the East River, at New York, side by side, or nearly so, running in the same direction, the steamer on the right or starboard hand of the other (when approaching from the west), when they shall have arrived abreast of the north end of Blackwell's Island, shall have the right of way, and the steamer on the left or port side shall check her way and drop astern. In like case when two steamers are approaching from the east, and are abreast at Negro Point, the steamer on the right or starboard hand of the other shall have the right of way, and shall proceed on her course without interference, and the steamer on the port side of the other shall keep at a safe distance astern (not less than three lengths) until both steamers have passed through the difficult channel.

RULE VIII. When steamers are running in the same direction, and the pilot of the steamer which is astern shall desire to pass on the right or starboard hand of the steamer ahead, he shall give one short blast of the steam whistle as a signal of such desire and intention, and shall put his helm to port; and the pilot of the steamer ahead shall answer by the same signal, or, if he prefer to keep on his course he shall give two short and distinct blasts of the steam-whistle, and the boat wishing to pass must govern herself accordingly, but the boat ahead shall in no case attempt to cross her bow or crowd upon her course.

N. B.—The foregoing rules are to be complied with in all cases except when steamers are navigating a crowded channel or in the vicinity of wharves. Under such circumstances steamers must be run and managed with great caution, sounding the whistle, as may be necessary, to guard against collision or other accidents.

SECTION 4233, Revised Statutes.—*Rule twenty-four.* In construing and obeying these rules due regard must be had to all dangers of navigation, and to any special circumstances which may exist in any particular case rendering a departure from them necessary in order to avoid immediate danger.

RULE IX. All double-ended ferry-boats on lakes and seaboard shall carry a central range of three clear, bright, white lights, showing all around the horizon, placed at equal altitudes forward, amidships, and aft; also such side lights as specified in section 4233, Revised Statutes, Rule III, paragraphs B and C.

Local inspectors in districts having ferry-boats shall, whenever the safety of navigation may require, designate for each line of such boats a certain light, white or colored, which shall show all around the horizon, to designate and distinguish such lines from each other, which light shall be carried on a flag-staff amidship, fifteen feet above the white range lights.

The line dividing jurisdiction between pilot rules on western rivers and lakes and seaboard at New Orleans shall be the lower limits of the city.

EXTRACTS FROM THE REVISED STATUTES.

SEC. 4233. The following rules for preventing collisions on the water shall be followed in the navigation of vessels of the Navy and of the mercantile marine of the United States.

STEAM AND SAIL VESSELS.

RULE I. Every steam-vessel which is under sail, and not under steam, shall be considered a sail-vessel; and every steam-vessel which is under steam, whether under sail or not, shall be considered a steam-vessel.

LIGHTS.

RULE II. The lights mentioned in the following rules, and no others, shall be carried in all weathers, between sunset and sunrise.

RULE III. All ocean-going steamers, and steamers carrying sail, shall, when under way, carry

(A) At the foremast head, a bright, white light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least five miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of twenty points of the compass, and so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side.

(B) On the starboard side, a green light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass, and so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side.

(C) On the port side, a red light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass, and so fixed as to throw the light from right ahead to two points abaft the beam on the port side.

The green and red lights shall be fitted with inboard screens, projecting at least three feet forward from the lights, so as to prevent them from being seen across the bow.

RULE IV. Steam-vessels, when towing other vessels, shall carry two bright white mast-head lights vertically, in addition to their side lights, so as to distinguish them from other steam-vessels. Each of these mast-head lights shall be of the same character and construction as the mast-head lights prescribed by Rule III.

RULE V. All steam-vessels, other than ocean-going steamers, and steamers carrying sail, shall, when under way, carry on the starboard and port sides lights of the same character and construction, and in the same position as are prescribed for side-lights by Rule III, except in the case provided in Rule VI.

RULE VI. River steamers navigating waters flowing into the Gulf of Mexico, and their tributaries, shall carry the following lights, namely: One red light on the outboard side of the port smoke pipe, and one green light on the outboard side of the starboard smoke-pipe. Such lights shall show both forward and abeam on their respective sides.

RULE VII. All coasting steam-vessels, and steam-vessels other than ferry-boats and vessels otherwise expressly provided for, navigating the bays, lakes, rivers, or other inland waters of the United States, except those mentioned in Rule VI, shall carry the red and green lights, as prescribed for ocean-going steamers; and, in addition thereto, a central range of two white lights; the after light being carried at an elevation of at least fifteen feet above the light at the head of the vessel. The head-light shall be so constructed as to show a good light through twenty points of the compass, namely: From right ahead to two points abaft the beam on either side of the vessel; and the after-light so as to show all around the horizon. The lights for ferry-boats shall be regulated by such rules as the board of supervising inspectors of steam-vessels shall prescribe.

PILOTAGE GOVERNED BY THE LAWS OF THE INDIVIDUAL STATES.

SEC. 4235. Until further provision is made by Congress, all pilots in the bays, inlets, rivers, harbors, and ports of the United States shall continue to be regulated in conformity with the existing laws of the States respectively wherein such pilots may be, or with such laws as the States may respectively enact for the purpose.

SEC. 4236. The master of any vessel coming into or going out of any port situate upon waters which are the boundary between two States, may employ any pilot duly licensed or authorized by the laws of either of the States bounded on such waters, to pilot the vessel to or from such port.

SEC. 4237. No regulations or provisions shall be adopted by any State which shall make any discrimination in the rate of pilotage or half pilotage between vessels sailing between the ports of one State and vessels sailing between the ports of different States, or any discrimination against vessels propelled in whole or in part by steam, or against national vessels of the United States; and all existing regulations or provisions making any such discriminations are annulled and abrogated.

PILOT REGULATIONS OF THE PORT OF SAN FRANCISCO, MARE ISLAND, AND BENICIA—EXTRACTS FROM THE POLITICAL CODE OF CALIFORNIA, WITH AMENDMENTS TO DATE.

ARTICLE V. SECTION 2439. Any person not the master or owner, and not holding a commission or license as a pilot, who pilots any vessel into or out of any harbor or port of this State for which there are commissioned or licensed pilots must be punished therefor as provided in the penal code, section 379, and must pay to the pilot entitled to pilot such vessel the amount of pilotage or towage collected by him.

SEC. 2432. All vessels, their tackle, apparel, and the furniture, and the master and owners thereof, are jointly and severally liable for pilotage fees, to be recovered in any court of competent jurisdiction.

SEC. 2433. If any pilot, in endeavoring to assist or relieve any vessel in distress, suffers loss or damage in his boats, sails, tackle, rigging, or appurtenances, the master, owner, or consignee of such vessel must pay the value of such loss or damage, to be ascertained by the commissioners.

SEC. 2434. Every pilot, on boarding a vessel, when required by the master thereof, must exhibit his commission as pilot. A refusal to do so subjects him to a forfeiture of his commission or license. * * *

SEC. 2435. Every pilot carried to sea against his will, or unnecessarily detained on board of a vessel, when a pilot-boat is in attendance to receive him, is entitled to receive the sum of eight dollars per day, while necessarily absent or detained, not to exceed in the aggregate the sum of one thousand dollars in any one case, which sum may be recovered by action against the master or owner of the vessel so taking him away.

SEC. 2437. When cruising off or standing out to sea, pilots must go to a vessel nearest to shore, or in the most distress, under a penalty of one hundred dollars. For refusing to go on board a vessel when required, a like penalty may be imposed. * * *

ARTICLE VI. SEC. 2459. Every pilot in charge of a vessel arriving in the port or harbor of San Francisco must safely moor the vessel in such position as the master of the vessel or harbor master may direct. He must prevent all persons (except officers of the State or Federal governments, owners or consignees of the vessel or cargo, and persons admitted on the express orders of the master), from boarding such vessel until she has been safely moored. To enforce the provisions of this section, and other police regulations for the harbor, every pilot in charge of a vessel entering the harbor of San Francisco is authorized and empowered to arrest every one who, in opposition to the master's orders, persists in boarding such vessel, or who, having boarded her, refuses to leave on command of such master or pilot. When so arrested, he must be immediately brought before the police judge's court, or admitted to bail, as provided in the Penal Code.

SEC. 2465. The pilotage inside the heads to the anchorage opposite San Francisco, and about the harbor, or between the harbor of San Francisco and the ports of Mare Island, Vallejo, or Benicia, must be at such rates as agreed on between the parties, not to exceed five dollars per foot draught.

SEC. 2466. The following shall be the rates of pilotage into or out of the harbor of San Francisco: Vessels under five hundred tons, five dollars per foot draught; all vessels over five hundred tons, five dollars per foot draught and four cents per ton for each and every ton of registered measurement. Vessels engaged in the whaling or fishing trade shall be exempt from all pilotage, except when a pilot is actually employed. When a vessel is spoken, inward or outward bound, and the services of a pilot are declined, one half of the above rates must be paid. In all cases where inward bound vessels are not spoken until inside of the bar, the rates of pilotage must be reduced fifty per cent. Vessels engaged in the whaling or fishing trades shall be exempt from all pilotage, except where a pilot is actually employed.

SEC. 2467. Any vessel in tow of a steam-tug between the harbor of San Francisco and the ports of Mare Island, Vallejo, or Benicia, shall be exempt from all charges for pilotage, unless a pilot is actually employed.

SEC. 2468. All vessels coasting between San Francisco and any port in Oregon, or in Washington or Alaska Territories, and all vessels coasting between ports of this State, are exempt from all charges for pilotage, unless a pilot is actually employed.

SEC. 2469. When two or more pilots shall offer their services to any vessel inward bound, the pilot first offering, or one connected with the same boat, shall have preference; and if the services of another be accepted, the vessel, her appurtenances, and the master and owner thereof shall be jointly and severally liable to the pilot entitled to such preference for one-half the amount of pilotage he would have been entitled to had his services been accepted.

SEC. 2470. Any pilot bringing a vessel into the harbor (or one connected with his boat) shall be entitled to take such vessel to sea again when she departs; *provided*, such pilot and those connected with his boat have not in the mean time become in any manner disqualified or incapacitated; and if such preference be disregarded by the master of such vessel, the vessel, master and owner shall be liable to the pilot entitled to such preference for one-half the amount to which he would be entitled if his services were accepted.

The act of March 19, 1889, gives the State Board of harbor commissioners jurisdiction over the water front of the harbor of San Francisco, as elsewhere detailed.

PILOT REGULATIONS FOR HUMBOLDT BAY.

Article VII of the Political Code gives the pilot regulations for Humboldt Bay and Bar, and Article X defines the duties of the harbor commissioners for the port of Eureka.

PILOT REGULATIONS FOR THE PORT OF WILMINGTON AND SAN PEDRO BAY.

The act of March 19, 1889, provides for the appointment of pilots for the port of Wilmington and San Pedro.

RULES AND REGULATIONS OF THE PORT OF SAN FRANCISCO.

[Adopted by the board of State harbor commissioners on December 21, 1886.]

1. Vessels must not be anchored, nor moored, between a line drawn from the outer end of Jackson Street wharf to the most southerly point of Yerba Buena, or Goat Island, and a line drawn from the outer end of Mission Street wharf to the Ferry slip of the South Pacific Coast Railroad Company, on the Alameda side of the bay; nor must they be anchored so as to permit them to swing between said lines.

2. Vessels must not be anchored, nor moored, between a line drawn from the intersection of the north line of Townsend street with the easterly line of the Pacific Mail Steamship Company's wharf to the extreme westerly end of the north training wall of Oakland Harbor, and a line drawn from the outer end of Berry Street pier to the extreme westerly end of the south training wall of Oakland Harbor; nor must they be anchored so as to swing between the said lines, nor within eight hundred feet of the Hay wharf.

3. Vessels must not be anchored, nor moored, between a line drawn from the southeasterly end of the grain sheds on the sea wall to the highest point of Angel Island, visible from the said southeasterly end of the said grain sheds, and a line drawn from the northwesterly end of the said grain sheds to the light on Alcatraz Island; nor must they be anchored so as to permit them to swing between the said lines.

4. Vessels must not be anchored, nor moored, within five hundred yards of a line drawn from the extreme northerly end of the sea wall, southerly through the extreme outer ends of the piers, to the intersection of the easterly line of Third street with the northerly line of Channel street.

5. Vessels propelled by steam, except when going to or leaving the sea wall, must not run inside of a line six hundred feet distant from and parallel with the said sea wall.

6. A vessel will not be entitled to a berth until an application shall have been made to the chief or assistant chief wharfinger; and such application must state the draught of the vessel, kind of cargo, and locality desired. No application shall be entertained unless the vessel be in the harbor and ready to be docked. Berths shall be assigned in the order of the application, provided that vessels ready to discharge cargo shall have preference over those ready to receive cargo.

No one except the chief or assistant chief wharfinger has authority to assign berths to vessels.

When a vacant berth is assigned to a vessel, said assignment will hold good for twenty-four hours, but for a berth not vacant said assignment will hold good twenty-four hours after it becomes vacant.

7. Vessels must haul or go into the stream at their own expense when ordered to do so by the chief or assistant chief wharfinger. Upon failure to obey such order the chief or assistant chief wharfinger shall have power to cause such removal at the expense of such vessel or vessels.

8. Vessels when being moved into a slip or alongside the wharf must approach "head on," and when at a wharf must lie head toward the shore. The studding-sail booms and sprit-sail yards must be rigged in; their off-shore anchors suspended ready for dropping; their lower and top-sail yards braced "sharp up" on their inshore braces, except when in actual use discharging or loading cargo; and, when required by the wharfingers, their movable fore-and-aft spars and martingale must be rigged in.

9. A vessel anchored or moored in the harbor, or lying in a slip or dock, must at all times have on board at least one seaman capable of taking proper care of such vessel. If it become necessary a vessel may be removed by order of the chief wharfinger at the expense of the owner, and the owner and the vessel shall be liable for all damage that shall arise thereby.

10. When ballast, stone, coal, bricks, ashes, cinders, dust, rubbish, or other loose matter or thing that will sink, is being landed from a vessel upon a wharf, or is being transferred from one

vessel into another, a canvas chute or other contrivance, to the satisfaction of the wharfinger, must be used to prevent any part of such substance from falling into the dock.

11. Fire must not be used on board of any vessel at the wharves or in the slips for heating pitch, tar, or other inflammable substances, but may be used on floating stages or boats for the purpose of heating such substances for repairing vessels; *provided*, such fire is constantly in the charge of a person capable of taking proper care of the same.

12. Every steam engine, when used upon any wharf for loading or unloading cargo, must receive upon its smoke-stack a bonnet or spark-catcher that will effectually prevent sparks from falling upon such wharf or upon the deck of any vessel.

13. Not more than one hundred piles or pieces of timber shall be discharged or allowed to remain in any slip or dock at any time; nor shall any piles or timber be left in any dock or slip over night without the permission of the wharfinger.

14. No substance that will sink or form an obstruction to navigation shall be deposited in the waters or on the shore of the harbor without first obtaining permission in writing from the harbor commissioners.

15. Rubbish or other substance on which no wharfage is charged shall be removed from the wharf by the person placing it there; and, on default, it must be removed by the wharfinger at such person's expense. Coal screens, donkey engines, and all stevedore's tools and appliances must be removed from the wharf when directed by the wharfinger.

16. Neither the slips, docks, basins, wharves, nor the spaces in front of them, nor the streets along the water front, shall be obstructed by any material or structure. If any such obstruction be not removed within twenty-four hours after notice, the material or structure constituting the obstruction shall be removed and stored, or sold by the commissioners, and twenty-five dollars will be charged for each day that the obstruction is permitted to remain, together with the expense of removal, storage, or sale.

17. No person shall have authority to collect dockage, wharfage, tolls, or rents, unless authorized by the board of State harbor commissioners, except on wharves held under lease, pursuant to acts of the Legislature. Lessees of wharves authorized to collect dockage, wharfage, or tolls must charge and collect the same rates as those fixed by the board for the wharves not under lease.

18. If any vessel leave a wharf, slip, dock, or basin, unless forced to do so by stress of weather, without first paying the dockage due, such vessel will be placed upon the delinquent list and must not be permitted to use any wharf, slip, dock, or basin without first paying double the bill incurred and ten dollars in addition thereto, except by permission of the commissioners.

19. The master, agent, or owner of a vessel refusing or neglecting to obey the orders of the chief or assistant chief wharfinger in any matter pertaining to the regulation of the harbor or removal or stationing of such vessel, is guilty of a misdemeanor, and liable to a fine not exceeding three hundred dollars or imprisonment not exceeding one hundred days.

20. In case any damage is done to a wharf, shed, or other structure on the water front by a vessel or otherwise, the said damage, together with the name of the vessel or person causing it, must be reported forthwith by the wharfinger to the chief engineer, and the expense of the repairs of said damage shall be a charge against such vessel or individual.

21. Dockage commences upon a vessel when she makes fast to a wharf, or comes within a dock, slip, basin, or canal; and each twenty-four hours thereafter, or part thereof, constitutes a day's dockage.

22. No deductions will be made for Sundays, holidays, or rainy days.

23. A vessel arriving from leased premises will be charged at the same rate and in the same manner as if arriving from the stream.

24. If a vessel occupies two different berths on the same day she will be charged dockage for but one day, which must be paid at the wharf first occupied.

25. Vessels may be assigned berths to repair at quarter dockage rates; but to entitle any vessel to the benefit of this rule, her owner, consignee, or captain must apply to the chief wharfinger, who may assign her, in writing, a berth, pursuant to such application. And in no case must the quarter rate commence before the date of the order assigning the berth, but must, in every instance, commence contemporaneously therewith, or at such a subsequent date as may be specified in the order.

26. The term wharf embraces every structure to which vessels make fast, or on which merchandise is discharged, or from which it is loaded.

DUTIES OF THE CHIEF WHARFINGER.

1. The chief wharfinger must station, berth, and regulate the position of vessels in the docks and harbor, and cause them to remove, from time to time and from place to place, as the general convenience, safety, and good order may require.

2. He shall require all ship-masters, consignees, pilots, and masters of tow-boats to conform to the regulations of the board.

3. He shall require the docks, slips, wharfs, piers and other premises under the jurisdiction of the board, to be kept free of all obstructions; and when parties fail to obey his order to remove the same, he must forthwith report the fact to the board, and execute its order in relation thereto.

EXTRACTS FROM THE CODES AND STATUTES.

If any master, agent, or owner of any water craft shall refuse or neglect to obey the lawful orders or directions of the chief warfinger in any matter pertaining to the regulations of said harbor, or the removal or stationing of any water craft, such master, agent, or owner so refusing or neglecting is guilty of a misdemeanor, and, upon conviction thereof before any court of competent jurisdiction, shall be punished by a fine not to exceed three hundred dollars, or by imprisonment not to exceed one hundred days in the jail of the city and county of San Francisco.—(Political Code, section 2541).

All persons are forbidden to deposit, or cause to be deposited, in the waters of the harbor of San Francisco, as described in the preceding sections, any substance that will sink and form an obstruction to navigation, without first obtaining the permission, in writing, of the board of State harbor commissioners, which permission shall describe, with an ordinary degree of certainty, the place where such deposit may be made; and the secretary of the board shall record such permission. Any person violating the prohibition contained in this section is guilty of a misdemeanor, and, upon conviction thereof before a court of competent jurisdiction, shall be fined not less than one hundred nor more than five hundred dollars, or imprisoned in the jail of the city and county of San Francisco not less than thirty nor more than ninety days: *Provided*, That nothing herein shall be construed to prevent or interfere with the construction of works now in progress in connection with Oakland Harbor.—(Political Code, section 2542.)

HARBOR FIRE BOATS.

There are two powerful steam fire-boats on constant duty in the harbor of San Francisco, and the steam fire-engines of the city have access to all the wharves.

RATES OF DOCKAGE FOR THE PORT OF SAN FRANCISCO.

[Each rate is for a day of twenty-four (24) hours, or any part thereof.]

1. For all ocean vessels, steam or sail, and all sail vessels, navigating the Bay of San Francisco, and the rivers and other waters flowing into it, of two hundred net registered tons or under, two cents per ton; for all such vessels of over two hundred net registered tons, four dollars for the first two hundred tons, and three fourths of a cent for each additional ton.

2. For steam-boats navigating the Bay of San Francisco and the waters flowing into it, and used for carrying freight or passengers, of two hundred tons or under, gross hull measurement, two cents per ton on such measurement, for such boats of over two hundred tons, gross hull measurement, four dollars for the first two hundred tons of such measurement, and three-fourths of a cent for each additional ton.

3. For barges of two hundred tons or under, two cents per ton; for barges over two hundred tons, four dollars for first two hundred tons, and three-fourths of a cent for each additional ton.

4. Vessels while taking in cargo, or receiving or discharging ballast, or lying idle, or occupying outside berths, or moored in docks, slips, basins, or canals, are subject only to half rates of dockage: *Provided*, That vessels not used for carrying freight or passengers shall not be entitled to such half rates.

5. When the per diem dockage of a vessel, as above prescribed, is not a multiple of five, it must be reduced or increased, as the case may be, to the nearest such multiple: *Provided*, That if it be equally near to two such multiples, it must be increased to the first such multiple above.

HEALTH AND QUARANTINE LAWS FOR THE HARBOR OF SAN FRANCISCO, 1889.

POLITICAL CODE.

SECTION 3004. The quarantine grounds of the bay and harbor of San Francisco are at the anchorage of Saucelito.

SEC. 3013. Shipmasters bringing vessels into the harbor of San Francisco, and masters, owners, or consignees having vessels in the harbor which have on board any cases of Asiatic cholera, small pox, yellow, typhus, or ship fever must report the same, in writing, to the quarantine officer before landing any passengers, casting anchor, or coming to any wharf, or as soon thereafter as they, or either of them, become aware of the existence of either of the diseases on board of their vessels.

SEC. 3014. No captain or other officer in command of any vessel sailing under a register arriving at the port of San Francisco, nor any owner, consignee, agent, or any other person having charge of such vessel must, under a penalty of not less than one hundred dollars, nor more than one thousand dollars, land, or permit to be landed, any freight, passengers, or other persons from such vessels until he has reported to the quarantine officer, presented his bill of health, and received a permit from that officer to land freight, passengers, or other persons.

SEC. 3015. Every pilot who conducts into the port of San Francisco any vessel subject to quarantine, or examination by the quarantine officer, must—

First. Bring the vessel no nearer the city than is allowed by law;

Second. Prevent any person from leaving and any communication being made with the vessel under his charge until the quarantine officer has boarded her and given the necessary orders and directions;

Third. Be vigilant in preventing any violation of the quarantine laws; and report without delay all such violations that come to his knowledge to the quarantine officer;

Fourth. Present the master of the vessel with a printed copy of the quarantine laws, unless he has one;

Fifth. If the vessel is subject to quarantine, by reason of infection, place at the mast head a small yellow flag.

SEC. 3016. Every master of a vessel subject to quarantine or visitation by the quarantine officer, arriving at the port of San Francisco, who refuses or neglects, either—

First. To proceed with and anchor his vessel at the place assigned for quarantine when legally directed so to do; or

Second. To submit his vessel, cargo, and passengers to the quarantine officer, and furnish all necessary information, to enable that officer to determine what quarantine or other regulations they ought respectively to be subject; or

Third. To report all cases of disease and of deaths occurring on his vessel, and to comply with all the sanitary regulations of the bay and harbor;

—is liable in the sum of five hundred dollars for every such neglect or refusal.

SEC. 3017. All vessels arriving off the port of San Francisco from ports which have been legally declared infected ports, and all vessels arriving from ports where there is prevailing at the time of their departure any contagious, infectious, or pestilential diseases, or vessels with decaying cargoes, or which have unusually foul or offensive holds, are subject to quarantine, and must be, by the master, owner, pilot or consignee, reported to the quarantine officer without delay. No such vessel must cross a right line drawn from Meiggs's wharf to Alcatraz Island until the quarantine officer has boarded her and given the order required by law.

SEC. 3018. The quarantine officer must board every vessel subject to quarantine or visitation by him immediately on her arrival, make such examination and inspection of vessel, books, papers, or cargo, or of the persons on board, under oath, as he may judge expedient, and determine whether the vessel should be ordered to quarantine; and, if so, the period of quarantine.

SEC. 3019. No captain or other officer in command of any passenger-carrying vessel of more than one hundred and fifty tons burden, nor of any vessels of more than one hundred and fifty tons burden having passengers on board, nor any owner, consignee, agent, or other person having charge of such vessel or vessels, must, under a penalty of not less than one hundred dollars, nor more than one thousand dollars, land or permit to be landed any passenger from a vessel before he has presented his bill of health to the quarantine officer, and received a permit from that officer

to land such passenger, except in such cases as the quarantine officer deems it safe to give the permit before seeing the bill of health.

SEC. 3020. The following fees may be collected by the quarantine officer: For giving a permit to land freight or passengers, or both, from any sailing vessel of less than five hundred tons burden from any port out of this State, two dollars and fifty cents; over five hundred and under one thousand tons burden, five dollars; each additional one thousand tons burden, or fraction thereof, an additional two dollars and fifty cents. For steam vessels, propelled in whole or in part by steam, of one thousand tons burden or less, five dollars, and two dollars and fifty cents for each additional one thousand tons burden, or fraction thereof; but vessels not propelled in whole or in part by steam, sailing to and from any port or ports of the Pacific States of the United States, or Territories, and whaling vessels entering the harbor of San Francisco, are excepted from the provisions of this section.

SEC. 3021. The board of health may enforce compulsory vaccination on passengers in infected ships, or coming from infected ports.

RESOLUTION OF BOARD OF HEALTH

Resolved, That all vessels arriving from China be required to come to anchor in the bay, and that all passengers be mustered on deck in the presence of the quarantine officer, and be subjected to a personal examination by him before being permitted to land. (Passed May 26, 1873.)

THE DUTY OF THE PORT-WARDENS OF SAN FRANCISCO AND OTHER PORTS OF CALIFORNIA.

POLITICAL CODE OF CALIFORNIA.

ARTICLE VIII. SECTION 2501. There are four port-wardens for the port and harbor of San Francisco, and one for each and every other port of entry within this State.

SEC. 2503. The port wardens, when required by any person interested in either vessel or cargo, must survey any vessel arriving in distress, or which has sustained damage or injury at sea, and survey in whole or in part the cargo thereof, and must survey the hatches, storage, and cargo of all vessels laden with general or assorted merchandise belonging or consigned to various parties.

The damage sustained at sea appertains to sails, rigging, spars, hull, and cargo, whether caused by stress of weather, stranding, collision, or by other accident.

Section 2511 prescribes a penalty of not less than five hundred dollars nor more than one thousand upon any other person who performs any of the duties of port-warden. In marine surveys the port-wardens are, however, authorized to recognize and co-operate with such parties as may be designated by the representatives of foreign governments, underwriters, and owners or consignees of vessels.

UNITED STATES SHIPPING COMMISSIONER AT SAN FRANCISCO.

The general business of the shipping commissioner is to afford facilities for engaging seamen, by keeping a register of their names and characters; to superintend their engagement and discharge; to provide means for securing their presence on board, and to facilitate the making of apprentices to the sea service. He shall hear and decide any question between a master, owner, or consignee, and any of the crew, and any award so made by him shall be binding on both parties.

SYNOPSIS OF THE SHIPPING ACT KNOWN AS "THE DINGLEY ACT," APPLYING TO VESSELS OF THE UNITED STATES. Approved June 26, 1884. Amendments to June 21, 1886.

SECTION 1. Relieves vessels, under certain conditions, from the penal tonnage tax heretofore levied for the employment of alien officers under the grade of master.

SEC. 2. Upon application, a consular officer can discharge a seaman who has completed his shipping agreement, but no extra wages are to be paid, except as provided in this act.

SEC. 3. Upon application of a seaman for discharge at a foreign port, on the ground that the voyage had been unnecessarily prolonged, or that he has received any injury in the service of the vessel, he shall receive one month's extra wages if so discharged.

SEC. 4. A seaman can procure his discharge in a foreign port and one month's extra wages, if the inspectors report that the vessel was sent to sea unsuitably provided, through neglect or design.

SEC. 5. If a vessel is sold in a foreign port, the seamen are entitled to one month's extra wages, unless other employment is given them as provided.

SEC. 6. If the desertion of a seaman is caused by cruel treatment, he shall be discharged by the consular officer, and receive one month's extra wages.

SEC. 9. All vessels in foreign ports, and bound to a home port, are required to transport destitute seamen on certain terms.

SEC. 10, as amended. Prohibits the payment of advanced wages to a seaman before reaching the port at which he is engaged: *Provided*, That it shall be lawful for any seaman to stipulate in his shipping agreement for an allotment of all or any portion of the wages which he may become due to his wife, mother, or other relative, or to an original creditor, in liquidation of any just debt for board or clothing, which he may have contracted prior to engagement, not exceeding ten dollars per month for each month of the time usually required for the voyage for which the seaman was shipped, under such regulation as the Secretary of the Treasury may prescribe; but no allotment to any person or corporation shall be lawful. And any master, owner, consignee, or agent of any foreign vessel who has violated this section shall be liable to the same penalty that the master, owner, or agent of a vessel of the United States would be for a similar violation.

SEC. 11. Every vessel is to be provided with a slop chest, containing a suitable complement of clothing, etc., to be sold to the seamen at a stipulated advance on cost. This section does not apply to vessels plying between the United States and Mexico, Central America, and some other countries on the Atlantic seaboard, nor to fishing or whaling vessels.

SEC. 12. Abolishes consular fees for services to vessels and seamen.

SEC. 13. Provides that a master shall require a written statement from the consular officer of all official services rendered by him, and furnish it to the collector of the district at which he shall first arrive.

SEC. 14. Abolishes the old tonnage tax of thirty cents a ton and imposes the tax at the rate of three and six cents, as specified, the total not to exceed fifteen and thirty cents per seaman, under certain conditions and stipulations.

SEC. 15. Abolishes the marine hospital tax on seamen.

SEC. 18. Limits the individual liability of a shipowner to the proportion of any or all liabilities that his individual share bears to the whole, and the aggregate liabilities of all the owners of a vessel on account of the same shall not exceed the value of such vessel and freight pending. *Amended* to apply to all sea-going vessels, and also to all vessels used on lakes, rivers, and inland navigation, including canal-boats, barges, and lighters.

SEC. 19. Prohibits the payment of additional fees when a seaman is re-engaged or reshipped on a vessel making regular trips between the United States and foreign countries. It also allows the engagement of a seaman for a vessel in the foreign trade for one or more round trips or for a *definite period*, whatever the destination of the vessel.

SEC. 20. Permits the similar engagement of a seaman in a foreign port upon a vessel in the foreign trade, and waives the requirement of reshipment of such seaman in a port of the United States, and also waives the requirement to return him to the United States.

SEC. 21. Permits the hailing port of a vessel to be either the port where she is documented, or the place where she is built, or where one or more of the owners resides.

AMENDMENTS OF JUNE 21, 1886.

SEC. 1. On and after July 1, 1886, no fees shall be charged or collected by collectors or other officers of customs, or by inspectors of steam vessels, or shipping commissioners for the following services to vessels of the United States, to wit: Measurement of tonnage and certifying the same; issuing of license or granting of certificate of registry, record, or enrollment, including all indorsements on the same, and bond and oath; indorsement of change of master; certifying and recording manifest, master's oath, and permit; granting permit to vessels licensed for the fisheries to touch and trade; granting certificate of payment of tonnage dues; recording bill of sale, mortgage, hypothecation, or conveyance, or the discharge of such mortgage or hypothecation; furnishing certificate of title; furnishing the crew list, including bond; certificate of protection to seamen; bill of health; shipping or discharging of seamen, as provided by Title 53 of the Revised Statutes and section 2 of this act; apprenticing boys to the merchant service; inspecting, examining, and licensing steam vessels, including inspection certificate and copies thereof; and licensing of masters, engineer, pilot, or mate of a vessel.

SEC. 2. Shipping commissioners may ship and discharge crews for any vessel engaged in the coastwise trade, or the trade between the United States and the Dominion of Canada, or Newfoundland, or the West Indies, or the Republic of Mexico, at the request of the master or owner of such vessel, the shipping and discharging fees in such cases to be one-half those prescribed by section 4612 of the Revised Statutes.

SEC. 5. Provides that upon every documented vessel of the United States, the number denoting her net tonnage shall be deeply carved, or otherwise permanently marked on her main beam, and shall be so continued, under penalty of thirty dollars on every arrival in a port of the United States.

SEC. 7. Imposes a fine of thirty dollars on each arrival at port of a vessel of twenty tons or upwards, trading from district to district, or between different places in the same district, or carrying on the fishery if entitled to be documented, and not so enrolled or licensed.

SEC. 8. Foreign vessels are liable to a fine of two dollars for each passenger transported from a port in the United States to any other port in the United States.

SUBMARINE TELEGRAPH CABLES IN SAN FRANCISCO BAY AND KARQUINEZ STRAIT—PENALTIES FOR DAMAGES.

The termini and routes of the different submarine telegraph cables in the Bay of San Francisco liable to be disturbed by vessels' anchors are indicated as follows:

Western Union Telegraph Company.—Two cables from Market Street wharf to the long wharf or pier on the Oakland side, are laid as nearly as practicable in the one-thousand feet wide passageway reserved by law for the protection of the ferry-boats. The termini are indicated by large signs: "Telegraph Cable Crossing."

Another cable has been laid from the Government wharf, near Fort Point, and runs northwardly five thousand feet, thence northwestwardly to the embankment in Horse Shoe Bay, joining the Needles to the main land. These termini are indicated by notices.

Another cable has been laid in the Karquinez Strait from the pier of the Southern Pacific Railroad Company on the north side of the street at Benicia, across the strait to a small ravine or cove on the south or Contra Costa shore. Both termini are indicated by large signs: "Telegraph Cable crosses here."

Sunset Telephone-Telegraph Company.—A cable is laid from Market Street wharf to the southwest shore of Yerba, Buena, or Goat Island, and from the easterly shore of this island to the railway shipping pier of the Southern Pacific Company on the Oakland side. The termini are indicated by large-sized notices.

A cable has been laid from the coal-bunkers of the Southern Pacific Company at Port Costa, across the Strait of Karquinez, to the northerly pier of the railroad company on the Benicia side. The termini are indicated by large-sized signs.

Another cable has been laid across the Strait of Karquinez from the northerly end of the Granger's wharf, which is about one mile westward from Port Costa, to a point directly opposite on the northern or Benicia shore. The termini are indicated by large signs, "Telegraph Cable Crossing."

Pacific Postal-Telegraph Cable Company.—A cable has been laid from the narrow-gauge ferry slip, situated between Market and Mission streets, to the westerly end of the south shipping pier of the railway company on the Oakland side of the bay. This terminus is indicated by a large white sign: "Pacific Postal-Telegraph Cable Crossing."

In the Karquinez Strait a cable has been laid from the westerly end of the Nevada dock warehouse, on the south shore, about half a mile east of Port Costa, to the Martinez and Benicia ferry landing on the north shore at Benicia. It is indicated by a sign: "Pacific Postal-Telegraph Cable Crossing."

PENALTIES FOR DAMAGING CABLES.

These signs denote the landing points of all telegraphic cables, as required by law, and persons or vessels breaking or damaging the cables, whether by dragging anchors or otherwise, are liable to a fine of not less than five hundred dollars or more than ten thousand dollars in addition to full damages arising from injury done to the cable. The law has been enforced in several cases, and damages amounting to fifteen hundred dollars and twenty-two hundred dollars have been obtained from different vessels.

HARBOR OF SAN FRANCISCO.

POLICE SIGNALS.

The harbor police are specially delegated for duty in the harbor of San Francisco, although they are under the general directions of the chief of police of San Francisco.

When the master of a vessel requires assistance from the police authorities the national flag covering his vessel must be displayed in the mizzen rigging between sunrise and sunset; and between sunset and sunrise a green or blue light must be shown at least twelve feet above the deck of the vessel.

PORT OF SAN DIEGO.

The custom-house regulations are the same as at San Francisco.

PILOTAGE.

The pilotage rates are as follows: All vessels under five hundred tons register, five dollars per foot draught, and all vessels over five hundred tons register, five dollars per foot draught and four cents per ton register.

When a vessel is spoken inward or outward bound and the services of a pilot are declined, one-half of the above rates must be paid.

There is always a boat cruising outside the bar, and as the services of the pilots are regulated by a board of pilot commissioners, it makes no difference which pilot is employed.

TOWAGE.

There is only one company (1889) doing towing at San Diego, and the tariff per net ton register is as follows:

Net tons register.	400 and under 600.	600 and under 800.	800 and under 1,000	1,000 and under 1,250.	1,250 and under 1,500	1,500 and under 1,750	1,750 and under 2,000.	2,000 and under 2,250.	2,250 and under 2,500
To or from sea *	$60.00	$75.00	$90.00	$115.00	$125.00	$135.00	$150.00	$160.00	$175.00
Docking and undocking	15.00	17.50	20.00	22.50	25.00	27.50	30.00	32.50	35.00

* Docking and undocking are included in these rates if the vessel proceeds immediately to or from the dock.

Charges for other services in proportion as agreed upon. The tow-boats are powerful, and are fitted in every way to perform their duties.

REVISED INTERNATIONAL REGULATIONS TO PREVENT COLLISIONS AT SEA.

ACT OF CONGRESS APPROVED MARCH 3, 1885.

Section 4233 Revised Statutes of the United States prescribes that the following rules for preventing collisions on the water shall be followed in the navigation of vessels of the Navy and of the mercantile marine of the United States.

STEAM AND SAIL VESSELS.

ARTICLE 1. Every steam-ship which is under sail and not under steam shall be considered a sailing-ship; and every steam-ship which is under steam, whether under sail or not, shall be considered a ship under steam.

LIGHTS.

ART. 2. The lights mentioned in the following articles numbered 3, 4, 5, 6, 7, 8, 9, 10, and 11 and no others, shall be carried in all weathers from sunset to sunrise.

ART. 3. A sea-going steamship, when under way, shall carry—

(*a*) On or in front of the foremast, at a height above the hull of not less than twenty feet, a bright *white* light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least *five* miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of twenty points of the compass, and so fixed as to throw the light ten points on each side of the vessel, viz, from right ahead to two points abaft the beam on either side.

(*b*) On the *starboard* side a *green* light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least *two* miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of ten points of the compass; and so fixed as to throw the light from right ahead to two points abaft the beam on the *starboard* side.

(*c*) On the *port* side a *red* light, of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least *two* miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon ten points of the compass; and so fixed as to throw the light from right ahead to two points abaft the beam on the *port* side.

(*d*) The green and red lights shall be fitted with inboard screens projecting at least three feet forward from the lights, so as to prevent them from being seen across the bow.

ART. 4. A steam-ship, when towing another vessel, shall, in addition to her side lights, carry *two* bright, *white* lights in a vertical line, one over the other, not less than three feet apart, so as to distinguish her from other steam-ships. Each of these lights shall be of the same character and construction, and shall be carried in the same position as the white light which other steam-ships are required to carry.

ART. 5. (*a*) A ship whether a steam ship or a sailing-ship, which, from any accident, is not under command, shall at night carry, in the same position as the white light which steam ships are required to carry, and if a steam-ship, in place of that light *three* red lights in globular lanterns, each not less than ten inches in diameter, in a vertical line, one over the other, not less than three feet apart, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least *two* miles, and shall by day carry, in a vertical line, one over the other, not less than three feet apart, in front of but not lower than her foremast head, *three* black balls or shapes, each two feet in diameter.

(*b*) A ship, whether a steam-ship or sailing-ship, employed in laying or in picking up a telegraph cable, shall at night carry, in the same position as the white light which steam-ships are required to carry, and if a steam-ship, in place of that light, *three* lights in globular lanterns, each not less than ten inches in diameter, in a vertical line, one over another, not less than six feet apart. The highest and lowest of these lights shall be *red*, and the middle one shall be *white*, and they shall be of such a character that the red lights shall be visible at the same distance as the white light. By day she shall carry, in a vertical line, one over the other, not less than six feet apart, in front of but not lower than her foremast head, *three* shapes, not less than two feet in diameter, of which the top and bottom shall be globular in shape and red in color, and the middle one diamond in shape and white in color.

(*c*) The ships referred to in this article, when not making any way through the water, shall not carry the side lights, but when making way shall carry them.

(*d*) The lights and shapes required to be shown by this article are to be taken by other ships as signals that the ship showing them is not under command, and can not, therefore, get out of the way.

ART. 6. A sailing-ship under way, or being towed, shall carry the same lights as are provided by Article 3 for a steam-ship under way, with the exception of the *white* light, which she shall never carry.

ART. 7. Whenever, as in the case of small vessels during bad weather, the green and red side-lights can not be fixed, these lights shall be kept on deck on their respective sides of the vessel, ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the *green* light shall not be seen on the *port* side, nor the *red* light on the *starboard* side.

To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted on the outside with the color of the light they respectively contain, and shall be provided with proper screens.

ART. 8. A ship, whether a steam-ship or sailing-ship, when at anchor, shall carry where it can best be seen, but at a height not exceeding twenty feet above the hull, a *white* light in a globular lantern of not less than eight inches in diameter, and so constructed as to show a clear, uniform, and unbroken light, visible all around the horizon, and at a distance of at least *one* mile.

ART. 9. A pilot vessel when engaged on her station on pilotage duty shall not carry the lights required for other vessels, but shall carry a *white* light at the mast-head, visible all around the horizon, and shall also exhibit a *flare-up* light or lights at short intervals, which shall never exceed

fifteen minutes. A pilot vessel, when not engaged on her station on pilotage duty, shall carry lights similar to those of other ships.

ART. 10. Open boats and fishing vessels of less than twenty tons net registered tonnage, when under way, and not when having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side lights; but every such boat and vessel shall, in lieu thereof, have ready at hand a lantern, with a green glass on the one side and a red glass on the other side, and on approaching to or being approached by another vessel, such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

ART. 11. A ship which is being overtaken by another shall show from her stern to such last mentioned ship a white light or a flare-up light.

[The exhibition of any light on board a vessel of war of the United States may be suspended whenever, in the opinion of the Secretary of War, the commander-in-chief of a squadron, or the commander of a vessel acting singly, the special character of the service may require it.]

SOUND SIGNALS FOR FOGGY AND THICK WEATHER.

ART. 12. A steam-ship shall be provided with a steam-whistle, or other efficient steam sound signals, so placed that the sound may not be intercepted by any obstructions, and with an efficient fog-horn to be sounded by a bellows or other mechanical means, and also an efficient bell. A sailing-ship shall be provided with a similar fog-horn and bell.

In fog, mist, or falling snow, whether by day or night, the signals described in this article shall be used as follows, viz:

(*a*) A steam ship under way shall make with her steam-whistle, or other steam sound signal, at intervals of not more than two minutes, a prolonged blast.

(*b*) A sailing-ship under way shall make with her fog-horn, at intervals of not more than two minutes, when on the starboard tack, one blast; when on the port tack, two blasts in quick succession, and when with the wind abaft the beam, three blasts in succession.

(*c*) A steam-ship and a sailing-ship, when not under way, shall, at intervals of not more than two minutes, ring a bell.

THE SPEED OF SHIPS MUST BE MODERATED IN FOGGY AND THICK WEATHER.

ART. 13. Every ship, whether a sailing-ship or a steam-ship, shall in a fog, mist, or falling snow, go at a moderate speed.

STEERING AND SAILING RULES.

ART. 14. When two sailing-ships are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other, as follows:

(*a*) A ship which is running free shall keep out of the way of a ship which is close hauled.

(*b*) A ship which is close hauled on the port tack shall keep out of the way of a ship which is close hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the ship which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the ship which is to windward shall keep out of the way of the ship which is to leeward.

(*e*) A ship which has the wind aft shall keep out of the way of the other ship.

ART. 15. If two ships under steam are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other. This article only applies to cases where ships are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two ships which must, if both keep on their respective courses, pass clear of each other. The only cases to which it does apply are when each of the two ships is end on, or nearly end on, to the other; in other words, to cases in which by day each ship sees the masts of the other in a line, or nearly in a line, with her own, and by night to cases in which each ship is in such a position as to see both the side lights of the other. It does not apply by day to cases in which a ship sees another ahead, crossing her own course, or by night to cases where the red light of one ship is opposed to the red light of the other, or where the green light of one ship is opposed to the green light of the other, or where a red light without

a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

ART. 16. If two ships under steam are crossing, so as to involve risk of collision, the ship which has the other on her own *starboard* side shall keep out of the way of the other.

ART. 17. If two ships, one of which is a sailing ship and the other a steam-ship, are proceeding in such direction as to involve risk of collision, the steam-ship shall keep out of the way of the sailing-ship.

ART. 18. Every *steam-ship* when approaching another ship so as to involve risk of collision, shall slacken her speed; or, if necessary, stop and reverse.

ART. 19. In taking any course authorized or required by these regulations, a steam-ship under way may indicate that course of any other ship which she has in sight, by the following signals on her steam-whistle:

One short blast to mean, "I am directing my course to starboard."

Two short blasts to mean, "I am directing my course to port."

Three short blasts to mean, "I am going full speed astern."

The use of these signals is optional, but if they are used, the course of the ship must be in accordance with the signal made.

ART. 20. Notwithstanding anything contained in any preceding article, every ship, whether a sailing-ship or a steam-ship, overtaking any other, shall keep out of the way of the overtaken ship.

ART. 21. In narrow channels every steam-ship shall, when it is safe and practicable, keep to that side of the fairway or mid channel which lies on the starboard side of such ship.

ART. 22. Where, by the above rules, one of the two ships is to keep out of the way, the other shall keep her course.

ART. 23. In obeying and construing these rules, due regard shall be had to all dangers of navigation, and to any special circumstances which may render a departure from the above rules necessary, in order to avoid immediate danger.

THE REGULATION OF IMMIGRATION LAWS OF THE UNITED STATES AND OF THE STATE OF CALIFORNIA.

AN ACT OF CONGRESS APPROVED AUGUST 3, 1882.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be levied, collected, and paid a duty of fifty cents for each and every passenger not a citizen of the United States who shall come by steam or sail vessel from a foreign port to any port within the United States. The said duty shall be paid to the collector of customs of the port to which such passenger shall come, or if there be no collector at such port, then to the collector of customs nearest thereto, by the master, owner, agent, or consignee of every such vessel, within twenty-four hours after the entry thereof into such port. The money thus collected shall be paid into the United States Treasury, and shall constitute a fund to be called the immigrant fund, and shall be used, under the direction of the Secretary of the Treasury, to defray the expense of regulating immigration under this act, and for the care of immigrants arriving in the United States, for the relief of such as are in distress, and for the general purposes and expenses of carrying this act into effect. The duty imposed by this section shall be a lien upon the vessels which shall bring such passengers into the United States, and shall be a debt in favor of the United States against the owner or owners of such vessels; and the payment of such duty may be enforced by any legal or equitable remedy: *Provided*, That no greater sum shall be expended for the purposes hereinbefore mentioned, at any port, than shall have been collected at such port.

SEC. 2. That the Secretary of the Treasury is hereby charged with the duty of executing the provisions of this act and with supervision over the business of immigration to the United States, and for that purpose he shall have power to enter into contracts with such State commission, board, or officers as may be designated for that purpose by the governor of any State to take charge of the local affairs of immigration in the ports within said State, and to provide for the support and relief of such immigrants therein landing as may fall into distress or need public aid, under the rules and regulations to be prescribed by said Secretary; and it shall be the duty of such State commission, board, or officers so designated to examine into the condition of passengers arriving at the ports within such State in any ship or vessel, and for that purpose all or any of such commissioners or officers, or such other person or persons as they shall appoint, shall be au-

thorized to go on board of and through any such ship or vessel; and if on such examination there shall be found among such passengers any convict, lunatic, idiot, or any person unable to take care of himself or herself without becoming a public charge, they shall report the same in writing to the collector of such port, and such persons shall not be permitted to land.

SEC. 3. That the Secretary of the Treasury shall establish such regulations and rules and issue from time to time such instructions not inconsistent with law as he shall deem best calculated to protect the United States and immigrants into the United States from fraud and loss, and to carrying out the provisions of this act and the immigration laws of the United States; and he shall prescribe all forms of bonds, entries, and other papers to be used under and in the enforcement of the various provisions of this act.

SEC. 4. That all foreign convicts except those convicted of political offenses, upon arrival, shall be sent back to the nations to which they belong and from whence they came. The Secretary of the Treasury may designate the State board of charities of any State in which such board shall exist by law, or any commission in any State, or any person or persons in any State whose duty it shall be to execute the provisions of this section without compensation. The Secretary of the Treasury shall prescribe regulations for the return of the aforesaid persons to the countries from whence they came, and shall furnish instructions to the board, commission, or persons charged with the execution of the provisions of this section as to the mode of procedure in respect thereto, and may change such instructions from time to time. The expense of such return of the aforesaid persons not permitted to land shall be borne by the owners of the vessels in which they came.

SEC. 5. That this act shall take effect immediately.

Printed rules and regulations based upon this act have been issued by the Secretary of the Treasury, dated July 1, 1889.

IMMIGRATION INTO CALIFORNIA.

LAWS OF THE STATE OF CALIFORNIA. (POLITICAL CODE.)

SECTION 2949. Within twenty four hours after the arrival of any vessel arriving at any of the ports of this State, bringing passengers from any place out of this State, the master of such vessel must make on oath, to the commissioner of immigration at such port, a written report.

The report must state the name, sex, place of birth, last residence, age, and occupation of all persons or passengers on board who are not citizens of the United States.

The master or commander of the vessel is required to administer an oath to any passenger of foreign birth who declares himself a citizen of the United States. The passenger must declare the time and place where the naturalization took place.

Special bonds are required for all lunatic, deaf, dumb, blind, crippled, or infirm persons whose circumstances make it probable they will become a burden on the State. The penalty for non report is two hundred dollars, and two hundred dollars penalty for each alien passenger not reported.

The commissioner of immigration has large powers to prevent the introduction of any person affected with the disease known as leprosy or elephantiasis. He is vested with the power and authority to detain all such persons on board any such vessel so arriving, and to assign the vessel to a berth or anchorage separate and apart from all other vessels, and at a safe and suitable distance from the shore.

If any person or consignee neglects or refuses to give any of the bonds required in the chapter on immigration within a specified time, he is liable to the State of California in the penal sum of one thousand dollars for each passenger, etc.

Masters of vessels arriving at any of the ports in the State from any port in this State, or from Oregon or Washington, are exempt from making the statement required by this chapter, under certain conditions; and so also are the masters of vessels arriving from Panama.

In all the ports in this State other than San Francisco, the mayor, or chief municipal officer at such port, etc., is *ex officio* commissioner of immigration for such port.

CHINESE.

Since the passage of the exclusion act of 1888 by the Congress of the United States, Chinese passengers can not be brought into the United States.

ACT OF THE CONGRESS OF THE UNITED STATES IN RELATION TO THE COLORING, NUMBERING, AND PLACING OF BUOYS, SPINDLES, TOWERS, ETC.

In conformity with section 4678 of the Revised Statutes of the United States, the following order is observed by the Light House Board in coloring and numbering the buoys along the coast, or in bays, harbors, sounds, or channels, viz:

1. In approaching the channel, etc., from seaward, red buoys, with even numbers, will be found on the starboard side of the channel, and must be left on the starboard hand in passing in.

2. In approaching the channel, etc., from seaward, black buoys, with odd numbers, will be found on the port side of the channel, and must be left on the port hand in passing in.

3. Buoys painted with red and black horizontal stripes will be found on obstructions, with channel ways on either side of them, and may be left on either hand in passing in.

4. Buoys painted with white and black perpendicular stripes will be found in mid-channel, and must be passed close to to avoid danger.

All other distinguishing marks to buoys will be in addition to the foregoing, and may be employed to mark particular spots, a description of which will be given in the printed list of buoys.

Perches, with balls, cages, etc., will, when placed on buoys, be at turning-points, the color and number indicating on what side they shall be passed.

Different channels in the same bay, sound, river, or harbor will be marked, as far as practicable, by different descriptions of buoys. Principal channels will be marked by nun-buoys; secondary channels, by can-buoys; and minor channels, by spar-buoys. When there is but one channel, nun-buoys, properly colored and numbered, are usually placed on the starboard side, and can-buoys on the port side of it.

Day-beacons, stakes, and spindles (except such as are on the sides of channels, which will be colored like buoys) are constructed and distinguished with special reference to each locality, and particularly in regard to the back-ground upon which they are projected.

Wherever practicable, the towers, beacons, buoys, spindles, and all other aids to navigation are arranged in the list in regular order as they are passed by vessels entering from sea.

The courses and bearings are magnetic; distances in nautical miles.

ABBREVIATIONS USED ON CHARTS AND BUOY LISTS.

R., red buoys, Nos. 2, 4, 6, etc., starboard.
B., black buoys, Nos. 1, 3, 5, etc., port.
P. S., white and black perpendicular stripes, without numbers, in mid-channel.
H. S., red and black horizontal stripes (on obstructions), without numbers.

LAWS FOR THE PROTECTION OF AIDS TO NAVIGATION.

UNITED STATES.

REVISED STATUTES

SEC. 5358. * * * Every person who holds out or shows any false light, or extinguishes any true light, with intent to bring any vessel sailing upon the sea into danger or distress or shipwreck, shall be punished by a fine of not more than five thousand dollars and imprisoned at hard labor not more than ten years.

AN ACT making appropriations for the construction, repair, preservation, and completion of certain public works on rivers and harbors, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, * * *

SEC. 3. * * * Any person who shall willfully and unlawfully injure any pier, breakwater, or other work of the United States for the improvement of rivers or harbors, or navigation in the United States, shall, on conviction thereof, be punished by a fine not exceeding one thousand dollars.

Approved August 14, 1876.

CALIFORNIA.

AN ACT for the protection of buoys and beacons.

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. Any person or persons who shall moor any vessel or boat of any kind, or any raft or scow, to any buoy or beacon placed in the waters of California by authority of the United States Light-House Board, or shall in any manner hang on to the same with any vessel, boat, raft, or scow, or shall willfully remove, damage, or destroy any such buoy or beacon, or any part of the same, or shall cut down, remove, damage, or destroy any beacon or beacons erected on land in this State by the authority aforesaid, shall, for every such offense, be deemed guilty of a misdemeanor, and, upon conviction thereof before any court of competent jurisdiction, be punished by a fine not exceeding five hundred dollars, or by imprisonment not to exceed six months; one-third of the fines in such cases to be paid to the informer and two-thirds thereof to the Light-House Board, to be used in repairing said buoys and beacons.

SEC. 2. The cost of repairing or replacing any such buoy or beacon which may have been misplaced, damaged, or destroyed by any vessel, boat, raft, or scow being made fast to the same, shall, when said cost shall have been legally ascertained, be a lien upon such vessel, boat, raft, or scow, and recovered against the same, and the owner or owners thereof, in an action of debt, in any court of competent jurisdiction in this State.

SEC. 3. This act shall take effect from and after its passage.

Approved March 26, 1874.

OREGON.

AN ACT for the protection of buoys and beacons.

Be it enacted by the Legislative Assembly of the State of Oregon:

SECTION 1. That any person or persons who shall moor any vessel or vessels of any kind or name whatsoever, or any boat, skiff, barge, scow, raft, or part of a raft, to any buoy or beacon placed in the navigable waters of the State, or in any bay, river, or arm of the sea bordering upon this State, by the authority of the United States Light-House Board, or shall in any manner hang on with any vessel, boat, skiff, barge, scow, raft, or part of a raft, to any such buoy or beacon, or shall willfully remove, damage, or destroy any such buoy or beacon, or shall cut down, remove, damage, or destroy any beacon or beacons erected on land in this State by the authority of the said United States Light-House Board, shall for every such offense be deemed guilty of a misdemeanor, and, upon conviction thereof, before any court of competent jurisdiction, shall be punished by a fine not less than one hundred nor more than two hundred dollars, or by imprisonment in the county jail not less than one or more than six months, or by both such fine and imprisonment, in the discretion of the court.

SEC. 2. That one half of all fines under this act shall be paid by the court to the informer, and that the other half shall be paid into the common school fund of the county in which the action shall be tried.

Approved October 16, 1874.

TERRITORY OF WASHINGTON.

AN ACT for the protection of buoys and beacons.

Be it enacted by the Legislative Assembly of the Territory of Washington:

SECTION. 1. That any person or persons who shall moor any vessel or vessels of any kind or name whatever, or any boat, skiff, barge, scow, raft, or part of a raft, to any buoy or beacon placed in the navigable waters of this Territory, or in any bay, river, or arm of the sea bordering upon this Territory, by the authority of the United States Light-House Board, or shall in any manner hang on with any vessel, boat, skiff, barge, scow, raft, or part of a raft, to any such buoy or beacon, or shall willfully remove, damage, or destroy any such buoy or beacon, or shall cut down, remove, damage, or destroy any beacon or beacons erected on land in this Territory by the authority of the United States Light-House Board, shall for every such offense be deemed guilty of a misdemeanor, and, upon conviction thereof, before any court of competent jurisdiction, shall be punished by a fine not less than one hundred or more than two hundred dollars, or by imprisonment in the

county jail not less than one nor more than six months, or by both such fine and imprisonment, in the discretion of the court.

SEC. 2. That one half of all fines under this act shall be paid by the court to the informer, and that the other half shall be paid into the common school fund of the county in which the offense shall be committed.

SEC. 3. This act to take effect and be in force from and after its passage.

Approved November 5, 1875.

UNITED STATES LIFE-SAVING SERVICE ON THE PACIFIC COAST OF THE UNITED STATES TWELFTH DISTRICT.

The following are the life-saving stations on the coasts of California, Oregon, and Washington, August, 1889:

Oceanside.—Thirty-three miles northwest of Point Loma Light-house. Authorized by Congress.

Point Conception.—Station not yet built; near the Light-house, and to the eastward.

Golden Gate Park.—On the outer beach, half a mile south of the Seal Rocks, off Point Lobos.

Fort Point.—Inside of Fort Point, Golden Gate, San Francisco Bay; in course of construction.

Ballenas Bay.—Inside the entrance to Ballenas Lagoon. Station destroyed by fire and not rebuilt.

Point Reyes.—Buildings in course of construction; on the outer beach, three miles north of the light house.

Humboldt Bay.—Inside the North Point, abreast the Light-house buildings.

Coquille River.—Authorized by Congress; site not yet determined.

Cape Gregory, or Arago.—Inside the rocky point upon which the light house is built.

Umpquah River.—Authorized by Congress. On the outer beach, south of the entrance to the river.

Yaquina River.—Authorized by Congress. Inside the south point of the entrance to the river.

Point Adams.—In course of construction; about half a mile inside of Fort Stevens.

Cape Disappointment.—In Baker's Bay, just inside the Light house point.

Loomis.—Authorized by Congress; on the "weatherbeach," ten and one-third miles north of North Head of Cape Disappointment; latitude 46° 27′ north.

Shoalwater Bay.—On the inside of the north point, near the Light-house boat-landing.

Gray's Harbor.—Authorized by Congress; site not yet determined.

Neeah Bay.—Inside of Cape Flattery, on the Indian reservation at west part of the bay.

INSTRUCTIONS TO MARINERS IN CASE OF SHIPWRECK, WITH INFORMATION CONCERNING THE LIFE SAVING STATIONS UPON THE PACIFIC COAST OF THE UNITED STATES.

[Life-Saving Service, Report of 1884.]

Upon the Pacific coast the life-saving stations are open throughout the year, but with the exception of the Cape Disappointment, Humboldt Bay, and San Francisco stations, they are not manned by regular crews, and depend upon the volunteer effort from the neighboring people in case of shipwreck.

All life-saving and life-boat stations are fully supplied with boats, wreck gun, beach apparatus, restoratives, provisions, etc.

Most of the life-saving and life-boat stations are provided with the International Code of Signals, and vessels can, by opening communication, be reported, or obtain the latitude and longitude of the station where they have been determined, information as to the weather probabilities in most cases; or if crippled or disabled, a steam-tug or revenue-cutter will be telegraphed for where facilities for telegraphing exist, to the nearest port, if requested.

The station crews patrol the beach from two to four miles each side of their stations four times between sunset and sunrise, and if the weather is foggy the patrol is continued through the day.

Each patrolman carries Coston signals. Upon discovering a vessel standing into danger, he ignites one of them, which emits a brilliant red flame of about two minutes' duration, to warn her off, or, should the vessel be ashore, to let her crew know that they are discovered and assistance is at hand.

If the vessel is not discovered by the patrol immediately after striking, rockets or flare-up

lights should be burned, or, if the weather be foggy, guns should be fired to attract attention, as the patrolman may be some distance away on the other end of his beat.

Masters are particularly cautioned, if they should be driven ashore anywhere in the neighborhood of the stations, especially on any of the sandy coasts where there is not much danger of vessels breaking up immediately, to remain on board until assistance arrives, and under no circumstances should they attempt to land through the surf in their own boats until the last hope of assistance from the shore has vanished. Often when comparatively smooth at sea a dangerous surf is running which is not perceptible four hundred yards off shore, and the surf when viewed from a vessel never appears as dangerous as it is. Many lives have unnecessarily been lost by the crews of stranded vessels being thus deceived and attempting to land in the ship's boats.

The difficulties of rescue by operations from the shore are greatly increased in cases where the anchors are let go *after entering the breakers*, as is frequently done, and the chances of saving life correspondingly lessened.

INSTRUCTIONS.

Rescue with the life boat or surf boat.—The patrolman, after discovering your vessel ashore and burning a Coston signal, hastens to his station for assistance. If the use of a boat is practicable, either the large life-boat is launched from its ways in the station and proceeds to the wreck by water, or the lighter surf-boat is hauled overland to a point opposite the wreck and launched, as circumstances may require.

Upon the boat reaching your vessel, the directions and orders of the keeper (who always commands and steers the boat) should be implicitly obeyed. Any headlong rushing and crowding should be prevented, and the captain of the vessel should remain on board to preserve order until every other person has left.

Women, children, helpless persons, and passengers should be passed into the boat first.

Goods or baggage will positively not be taken into the boat until all are landed. If any be passed in against the keeper's remonstrance he is fully authorized to throw the same overboard.

Rescue with the breeches-buoy or life-car.—Should it be inexpedient to use either the life boat or surf-boat, recourse will be had to the wreck-gun and beach apparatus for the rescue by the breeches buoy or the life-car.

A shot with a small line attached will be fired across your vessel.

Get hold of the line as soon as possible and haul on board until you get a tail block with a whip or endless line rove through it. This tail-block should be hauled on board as quickly as possible to prevent the whip drifting off with the set or fouling with wreckage, etc. Therefore, if you have been driven into the rigging where but one or two men can work to advantage, cut the shot-line and run it through some available block, such as the throat or peak-halyards block or an open block which will afford a clear lead, or even between the ratlines, that as many as possible may assist in hauling.

Attached to the tail-block will be a tally-board, with the following directions in English on one side and French on the other:

"Make the tail of the block fast to the lower mast, well up. If the masts are gone, make it to the best place you can find. Cast off shot-line, see that the rope in the block runs free, and show signal to the shore."

As soon as your signal is seen a three inch hawser will be bent onto the whip and hauled off to your ship by the life-saving crew.

If circumstances will admit, you can assist the life-saving crew by manning that part of the whip to which the hawser is bent and hauling with them.

When the end of the hawser is got on board a tally-board will be found attached, bearing the following directions in English on one side and French on the other:

"Make this hawser fast about two feet above the tail-block; see all clear, and that the rope in the block runs free, and show signal to the shore."

Take particular care that there are no turns of the whip line round the hawser, to insure which pass the end of the hawser up between the parts of the whip before making it fast.

When the hawser is made fast, the whip cast off the hawser, and your signal seen by the life-saving crew, they will haul the hawser taut and by means of the whip will haul off to you the breeches-buoy suspended from a traveler-block, or a life-car from rings, running on the hawser.

If the breeches-buoy be sent, let one man immediately get into it, thrusting his legs through the

breeches. If the life-car, remove the hatch, place as many persons into it as it will hold (five or six) and secure the hatch on the outside by the hatch-bar and hook, signal as before, and the buoy or car will be hauled ashore. This will be repeated until all are landed. On the last trip of the life-car the hatch must be secured by the inside hatch-bar.

In many instances two men can be landed in the breeches-buoy at the same time, by each putting a leg through a leg of the breeches and holding on to the lifts of the buoy.

Children when brought ashore by the buoy should be in the arms of older persons or securely lashed to the buoy. Women and children should be landed first.

In signaling as directed in the foregoing instructions, if in the day-time, let one man separate himself from the rest and swing his hat, a handkerchief, or his hand; if at night, the showing of a light, and concealing it once or twice, will be understood; and like signals will be made from the shore.

Circumstances may arise, owing to the strength of the current or set, or the danger of the wreck breaking up immediately, when it would be impossible to send off the hawser. In such a case a breeches-buoy or life-car will be hauled off instead by the whip, or sent off to you by the shot-line, and you will be hauled ashore through the surf.

If your vessel is stranded during the night and discovered by the patrolman, which you will know by his burning a brilliant red light, keep a bright lookout for signs of the arrival of the life-saving crew abreast of your vessel.

From one to four hours may intervene between the burning of the light and their arrival, as the patrolman may have to return to his station, perhaps three or four miles distant, and the life-saving crew draw the apparatus or surf-boat through the sand or over bad roads to where your vessel is stranded.

Lights on the beach will indicate their arrival, and the sound of cannon-firing from the shore may be taken as evidence that a line has been fired across your vessel. Therefore, upon hearing the cannon, make strict search aloft, fore and aft, for the shot-line, for it is almost certain to be there. Though the movements of the life-saving crew may not be perceptible to you, owing to the darkness, your ship will be a good mark for the men experienced in the use of the wreck-gun, and the first shot seldom fails.

RECAPITULATION.

Remain by the wreck until assistance arrives from the shore, unless your vessel shows signs of immediately breaking up.

If not discovered immediately by the patrol, burn rockets, flare-up, or other lights, or, if the weather be foggy, fire guns.

Take particular care that there are no turns of the whip-line round the hawser before making the hawser fast.

Send the women, children, helpless persons, and passengers ashore first.

Make yourself thoroughly familiar with these instructions, and remember that on your coolness and strict attention to them will greatly depend the chances of bringing you and your people safely to land.

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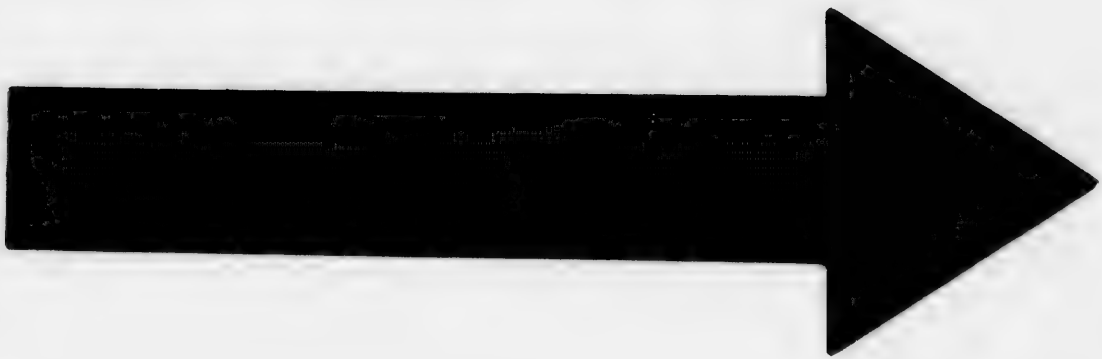

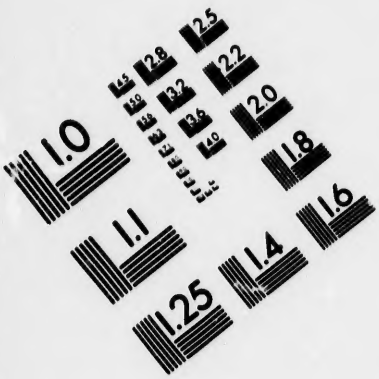

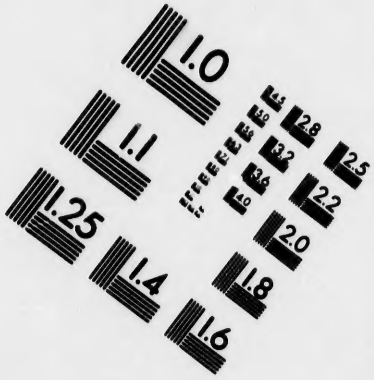

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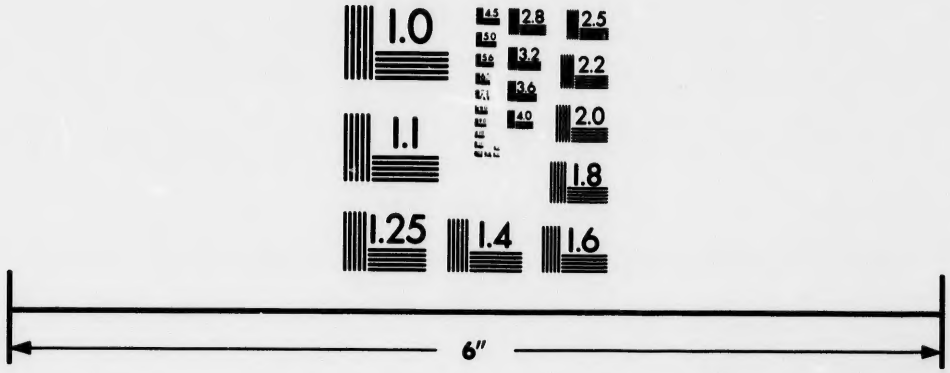

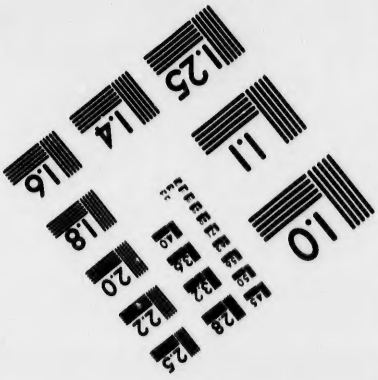

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